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EPA/NARSTO PM MEASUREMENT RESEARCH

WORKSHOP

“Breakout Group: Source/Receptor Relationships”

July 22, 1998

MR. CASS: The purpose of this breakout session is to try to provide the rest of the meeting with some advice on the source apportionment possibilities for the supersites program that EPA is discussing. The overall purpose of the meeting is to try to see if we can find out where the overlaps are between the kinds of measurements that people would like to see for health effects related research, and to find out where those overlaps exist with the kinds of measurements that people in the physical science community would like to see made for purposes of atmospheric science and for purposes of determining source contributions to atmospheric particle concentrations in ways that might assist the formulation of control programs.

Our particular task is to try to address advice to EPA on source apportionment and the support that measurements might provide to that enterprise. You have before you an advance pamphlet that was prepared

1 for the meeting. Some of them have sort of green
2 covers. Some of them have kind of bluish covers. But,
3 within that document, on Page 15 and following, are a
4 series of pages that Pradeep Saxena and I put together,
5 give an attempt to anticipate some of the topics which
6 would be discussed with respect to how the supersites
7 program might be used to advance air quality modeling,
8 model validation, source apportionment work, and other
9 similar topics. What Pradeep and I did, as I mentioned
10 briefly in the discussions downstairs, was to ask
11 ourselves, well, what kind of models would people want
12 to use for source apportionment work. We discussed
13 the existence of both source oriented models, aerosol
14 processes and receptor oriented models based on
15 chemical tracers. We took a look at the air quality
16 modeling domains that might be required for evaluation
17 and application of those models, and then asked
18 ourselves, given the premise of the supersites program,
19 the premise being, let's say, 7 plus or minus 1, aerosol
20 observatories that could be deployed at cities or in
21 regions around the country for the purposes of taking
22 very detailed size distribution, chemical composition,
23 time series data, speciation data on atmospheric
24 particles and the surrounding gases- given six or eight
25 sites of that kind, how could those data best be
26 integrated with model evaluation, source
27 apportionment, and related research? What we decided

1 to put up as a strawman's suggestion for consideration
2 by this group is the premise that perhaps stations of
3 that kind could be used much the way that they were
4 used during the Southern California Air Quality Study.
5 The mode of operation there was one or two supersite-
6 like platforms. In particular, Claremont, California with
7 all of the aerosol research instrumentation in the
8 country pretty much, being exercised simultaneously at
9 that site, surrounded by another seven or eight air
10 monitoring locations that were equipped with sequential
11 filter based samplers for aerosol speciation and
12 monitors for ozone, NO, NO₂, CO and speciated VOCs.
13 In other words, a central monitoring station, elaborate
14 instrumentation, and half a dozen satellite stations
15 surrounding it.

16 That worked very well during the SCAQS. It
17 gave us both spatial information at moderate chemical
18 size resolution and very detailed size, time, and
19 chemical species data at one location. Taking that
20 concept and asking ourselves, well, how could that be
21 applied, you know, to EPA's national needs, we took a
22 look at what are the monitoring group systems over
23 which people are presently modeling. We know what's
24 going on in California, both in the Los Angeles area and
25 up in the northern part of the state, surrounding the
26 San Joaquin Valley and the coastal cities. There are
27 SCAQS like experiments being performed periodically in

1 those areas and models being readied for use
2 periodically in those areas. So, as far as we know,
3 there is an attempt to model in great detail situations
4 that occur in California and there is an attempt being
5 made to model in great detail the entire eastern half of
6 the United States from somewhere in the middle of
7 Texas off over the Atlantic Ocean and throughout
8 southern Canada down to the Gulf Coast. Including
9 Florida and even down in the Gulf itself.

10 We then looked at the potential for locating a
11 number of these supersites in the eastern U.S. in a way
12 that might rationally cover that very large modeling
13 domain and tried to say, well, what would happen if we
14 placed, you know, five or six of the supersites within
15 that grid with satellite stations at a ratio of about six
16 times the number of supersites, scattered in subsidiary
17 locations throughout that area? Would that provide
18 SCAQS like data for the eastern half of the United
19 States that would be useful to people who want to do
20 aerosol processes modeling in the eastern half of the
21 United States and tracer based, receptor based
22 modeling in the eastern half of the United States, and
23 possibly bench marking and development of models for
24 annual average, particularly of air quality that might be
25 stripped down versions of episodic models.

26 In any case, this is the thought process that
27 we went through, and what we'd like to do now is to see

1 if we could critique the suggestions that were made, try
2 to determine whether this, in your opinion, is desirable,
3 practical, and are there major or minor adjustments that
4 ought to be made, so that we can formulate a final set
5 of recommendations and send them off to the folks
6 downstairs tomorrow.

7 Now, Pradeep has set forth a number of key
8 principles that are contained in the strawman report,
9 and maybe it would be worthwhile to go through those
10 one at a time and sort of gather people's agreement or
11 disagreement to some of the general overriding
12 principles. Principle #1 is that we should be thinking in
13 terms of region wide or regional experiments and not
14 just supersites in isolation. The original EPA supersite
15 program essentially said, let's just put out certain
16 monitoring platforms and there was no particular
17 purpose stated for them other than gathering better
18 atmospheric data, and what Pradeep and I are
19 recommending here is essentially, do not think about
20 these things as individual monitoring stations, but we
21 think about experiments designed to satisfy particular
22 needs. In other words, a large scale special study that
23 makes use of six or seven of these sites, plus other
24 collateral assets in order to undertake a specific
25 research program, in this case, source apportionment
26 research program, using those data as the basis for
27 that analysis. Is there broad agreement or

1 disagreement with the principle that we should be
2 designing experiments and not just siting seven pieces
3 of hardware, seven collections of hardware? Any
4 comments? Yes.

5 **SPEAKER:** I guess fundamentally,
6 what this means is that we're looking at the monitors
7 not being in one place for a long time. And rather that
8 they be assigned to a certain regional experiment or,
9 I'm just trying to get that distinction because if we put
10 six or seven in one region, what do we have for
11 someplace else?

12 **MR. CASS:** Well, here's the
13 problem. There's only enough money, if we're very,
14 very lucky, to put out six or seven of these heavily
15 instrumented sites anywhere in the country, and to
16 make sure modeling or evaluation of grid based models
17 requires that these observations be made
18 simultaneously over a big grid system. So at least
19 while that kind of observational experiment is going on,
20 you're not going to want to be moving the stations
21 around, I don't think. How long this program might last
22 is something I couldn't tell you. I couldn't tell you
23 whether EPA envisions these being sites that we'll set
24 up now and run for the next 20 years at some level,
25 intense but maybe not as intense as various special
26 studies, or whether this is envisioned, as Pradeep and I
27 have suggested, at least as a minimum, being a couple

1 of years toward data collection for the purposes of
2 creating a model evaluation data base. I think the
3 economics of the situation might dictate that answer.
4 Everybody would want to have long term data this time.
5 Walt?

6 **SPEAKER:** Well, again, the
7 modeling domain that you had envisioned for the east
8 was one that contained a fairly large fraction of the
9 U.S. population.

10 **MR. CASS:** Oh, it certainly does.

11 **SPEAKER:** One of the things that I
12 thought we might want to look at is, in terms of trying to
13 move both from the urban to regional scale, is some
14 sort of a nested approach to the subsidiary sites around
15 the central site, so that we have a sort of increasing
16 scale at which the locations of the subsidiary sites are
17 placed and, by being clever, as we expand the scale
18 outward from the main sites, we're going to wind up with
19 overlaps. So we can save locations by having them do
20 multiple duty to multiple primary sites.

21 **MR. CASS:** Yeah, I think as a
22 practical matter, what we're probably talking about here
23 is using EPA's proposed speciation monitoring sites as
24 the subsidiary sites, and that means that if we have a
25 specific set of recommendations on the spatial
26 distribution of those sites, they need to be provided to
27 EPA early enough to influence where they decide to put

1 speciation monitors. Frank?

2 **SPEAKER:** I'd like to pick up on
3 what he said. Our, quote, model system is designed to
4 do that grid that he's talked about here, with 36
5 kilometers initially and then within that domain, within
6 that 36 kilometer grid of size, in that large domain for
7 the eastern half of the United States, our next level of
8 nesting down is at 12 kilometer grid cells and then we
9 design a 4 kilometer urban oriented component that
10 nests off that. So that we could consider sub-domains
11 of that as possibilities also.

12 **MR. CASS:** Do I hear, we're talking
13 about variations on how to design a good regional
14 program of this kind? The first question, though, that I
15 had on the table is, is there any disagreement with the
16 notion that we should be looking at effectively the
17 coordinated use, across a large geographic area, of a
18 half a dozen or so of these sites as part of one, big
19 effort to evaluate models that are already being
20 developed to run off of this area? Right now, there is
21 no model evaluation data set that could be used to test
22 a model adequately that operates over that large
23 geographic domain. In the sense that the data sets are
24 available out here, for example, are 10 years old at
25 present. Yeah?

26 **SPEAKER:** I have a question of
27 resources and manpower. As you said, the SCAQS

1 study had basically everybody in the country together in
2 one city, Claremont, at one time. Is it feasible for the
3 measurements that you have in mind for supersites, to
4 have several of them going simultaneously at
5 considerable air distances from each other?

6 **MR. CASS:** I think that there are
7 some very serious questions about how to organize and
8 conduct a study of this geographic magnitude in terms
9 of its practicality. That, however, was not the task that
10 we were given. What we were told was, EPA is willing
11 to put out seven or eight, we presume that EPA is going
12 to put out seven or eight of these supersites. How can
13 they best, and they're going to make these kinds of
14 measurements, how could they best be used to satisfy
15 the need of source apportionment model evaluation? I
16 agree with you. It's going to be very tough to actually
17 do.

18 **SPEAKER:** Maybe I should
19 rephrase. Where is the manpower envisioned as coming
20 from? This is not going to be state run operations like
21 Pam's. Is that correct?

22 **MR. CASS:** My belief from what I've
23 heard in the hallways, and there haven't been any
24 decisions about how to implement this, and maybe there
25 are other people in the room who know more what EPA
26 is thinking than I do, but my belief is that they would
27 plan to contract with, let's say, universities, to operate

1 a supersite specified as consisting of a package of
2 equipment to be operated on a certain schedule. So, if
3 you could conceive of universities that have the
4 capability of running a group of fairly sophisticated
5 devices and ask yourself, of the five or six of them, that
6 sit in about the right locations, you might get an answer
7 to your question of whether or not this is doable.

8 That's one way to look at it. There's also
9 ways to sub-contract, you know, to consulting firms and
10 others who operate monitoring sites for a living, but my
11 guess is that this is going to be a contractual obligation
12 of either a university or a private firm to run one or
13 more of these sites on the schedules that match our
14 requirements. Yeah?

15 **SPEAKER:** A large piece of that
16 logistics not only operating the sites, but getting the
17 analyses done and who is going to manage all that
18 data? Who is going to validate all that data? How is it
19 going to be done in a consistent way from one site to
20 another?

21 **MR. CASS:** We're not, I don't think,
22 trying to answer those questions today.

23 **SPEAKER:** But it has a direct
24 bearing on the success of the source apportionment
25 studies.

26 **MR. CASS:** Of course it does. It
27 does. But, what's going on right now is a discussion at

1 a somewhat different level. It's a question of if you
2 could get the data, according to certain measurement
3 protocols, would that collection of data be appropriate
4 to meet with certain needs, and the question of how to
5 actually perform the experiments, how to manage the
6 data base that results and so forth and, as far as I
7 know, the question of how to get the money to do all of
8 the above is not yet understood, and I don't think we're
9 going to be able to answer those questions for EPA
10 today. What we're trying to do is find out, if you put at
11 a site a collection of instruments, and let's presume
12 that they would be operated correctly and that the data
13 would be archived correctly and the data would be
14 delivered to a group of people who are going to be
15 doing modeling work based on that data, would the
16 modelers find the collection data to be appropriate to
17 their needs? Would the modeling and analysis that
18 would be done off of this data be valuable to the nation
19 as a whole? Feasibility of actually doing this is
20 important, but we're not going to get the answers to
21 these questions today, I don't think. What we want to
22 find out is what would we like to do if we could. Yes?

23 **SPEAKER:** To address the issue of
24 size with this domain, I wonder if it's reasonable to
25 think that we're going to, as far as the data, be able to
26 do this level of model performance check. 36
27 kilometers might be meaningful versus 12 kilometers or

1 4 kilometers, and would you be, I know in general you
2 don't get concerned about the performance models, like
3 the whole domain. But it may be that you want to focus
4 on two of those areas, and they actually could be 12
5 kilometer or 4 kilometer domains, and then the question
6 I ask is it better to have an intensive monitor here and
7 then two more grids on the way at another one or do we
8 want to locate them somehow consistent with each
9 other, so that at least some portion of the domain can
10 do a realistic performance check. That's why when I
11 look at the dots, I'm a little worried, are they spaced so
12 far apart that when you do your performance check,
13 you're just going to still be looking at the fact that the
14 regional scale model is all probably acceptable.

15 **MR. CASS:** Let me put it this way.
16 No matter what grid scale you decide to use, you're
17 always going to have more grid cells than you have
18 monitoring sites for sure. Now, the kind of model that
19 Ted's working with has a master grid system. He can
20 put a high resolution grid system down over any of the
21 areas where he wants higher resolution predictions.

22 **SPEAKER:** Here's the question. For
23 the Atlanta site, you can put a nest at 4 kilometers. Is
24 one intensive monitor in that area sufficient to do an
25 adequate evaluation with a modeler?

26 **MR. CASS:** The answer to your
27 question is from the top down. How many monitoring

1 sites with that level of sophistication is the country
2 going to give you to do anything with? All right? The
3 answer is, maybe six or seven. Are you going to afford
4 to be able to put more than one of those in an urban
5 area? The answer is no.

6 **SPEAKER:** Here's I guess my
7 question. If you put the monitors close together and
8 you do an extremely good job of measuring in that
9 section, saying that the chemistry model is 24 hour, the
10 dynamics, is that better than just scattering across? I
11 guess I just kind of wonder if you do that one check in
12 Atlanta and that one check in Baton Rouge and say in
13 general the model is good...

14 **MR. CASS:** You have, well, you've
15 got probably on the order of 40 or so of these satellite
16 sites which are providing, under the proposal that's
17 being made, four hour time resolution for 30 some
18 chemical species in the size range of interest we've
19 got. Much higher than average resolution data at 40 or
20 50 different divisions.

21 **SPEAKER:** These are located to
22 complement the other sites?

23 **MR. CASS:** Yes, that's why we're
24 talking about, yeah. We're getting into too many of the
25 low level details, rather than answering the question I
26 wanted to get on the board first. The first one was, is
27 there general agreement with the principle that we're

1 looking at trying to coordinate the use of these sites
2 across geographic areas that include more than one
3 site? Is there any merit at all to trying to get a model
4 evaluation data base, given the available resources for
5 the grid system that people are, in fact, going to use for
6 modeling purposes? Yeah?

7 **SPEAKER:** I think it's an excellent
8 way to do it this way. The one thing that we don't have
9 is, we do not have high quality observations on a scale
10 that has been done either in San Joaquin Valley or in
11 L.A. In the eastern United States we need good data,
12 geographically dispersed, to be done. Just to say what
13 is out there in the same kind of detail as we did in the
14 California study. So I think you have that set up right
15 there. I think the issue that I was raising about the
16 grid sizes was if you wanted to characterize, say, the
17 southeast with biogenics, that would be one subset that
18 you could use with careful analysis. The other thing is
19 what's going on in the northeast. These are questions
20 that we need to think about here.

21 **MR. CASS:** You just asked two
22 questions and they're not the same. I think the
23 questions that were asked, the answer to one of them is
24 yes and the other one is a no. The one of them being
25 do we want to coordinate across different supersites,
26 and the second being do we want to use grids on the
27 scale that people are using in their models, which I

1 think most of us understand that whole eastern U.S.
2 square. If a person could believe in coordinating
3 across supersites, but putting the supersites within a
4 smaller overall grid.

5 **SPEAKER:** That's true. The
6 question is small scale variability. Do you believe
7 there's enough small scale variability that you need to
8 put all six supersites within a small region or you need
9 to spread them out, believing there is not any small
10 scale variability, or there is variability, but not small
11 scale...

12 **MR. CASS:** Or can you use the
13 satellites to give you enough information on a small
14 scale variability? I think that what we've done in
15 southern California...we've only had one at a time,
16 central monitoring sites of the sophistication we're
17 talking about for a supersite operating in southern
18 California doing PM model evaluation experiments. If
19 we had six or eight or nine satellite sites operating
20 simultaneously, it would tell us something about what's
21 going on in space, but without the extraordinarily
22 sophisticated aerosol measurements of central
23 monitoring. Yeah?

24 **SPEAKER:** One question and then
25 perhaps a comment. The question is this. When you
26 were doing the southern California study, and you had
27 your connected set of sites, your supersite with

1 subsidiary sites around it, what did you have in the way
2 as support for that, meteorology in the form of profilers
3 to give you some information about the dissemination of
4 compounds to the atmosphere and was that helpful in
5 obtaining the high quality results that you got from that
6 study?

7 **MR. CASS:** There is a section in the
8 equipment list that provides for lots of meteorological
9 measurements to go with these. It turns out, in
10 southern California, we had probably half a dozen or so
11 special sets of vertical sound waves being made
12 throughout the study region and the existing ground
13 based meteorological network was rather dense in that
14 area as you well know.

15 **SPEAKER:** Was that germane?

16 **MR. CASS:** Well, of course, for
17 transport of the reaction model, it was absolutely
18 indispensable.

19 **SPEAKER:** The comment is this.
20 That if you just had the supersites in those locations,
21 which would probably be urban areas, you'd probably
22 find some zero corridor information about the chemical
23 speciation of the aerosols that would be characteristic
24 to that urban region and that at least would begin to
25 give you a kind of zero corridor test of how well we
26 were able to simulate the chemical composition of the
27 aerosols in a variety of different regions across the

1 area. In that sense, it would be a step in the right
2 direction, but certainly it wouldn't represent any kind of
3 critical test.

4 **SPEAKER:** Well, I guess, from a
5 conceptual point of view, I'm a little, I'm not surprised
6 because I think what you guys did is really excellent,
7 but I was trying to figure out how this was linked to the
8 sort of regulatory agency needs for ozone, where you
9 have a bunch of complementary, you know, similar
10 measurements that also would be made for the purposes
11 of ozone, and it seems like we're real focused on
12 modeling applications, but there's a couple of other,
13 you know, really important things. There's emission
14 inventory, emission estimate, reconciliation kind of
15 questions that these data are supposed to answer and
16 then, real fundamentally, I thought the whole, a lot of
17 the discussion this morning of supersites was about
18 providing health based information that, by definition,
19 would be urban in scale specifically.

20 **MR. CASS:** EPA started out with the
21 premise, well, we don't know anything much about
22 particle size and composition to a high level of detail.
23 Let's just put out six or seven or eight observatories
24 and find out if we can make really detailed
25 measurements. They didn't have any really useful data
26 in mind beyond the fact that maybe measurements
27 needed to be made. What's happening now is, in the

1 various groups around this building, different
2 communities are being asked in detail, how could those
3 measurements be made to help that community with
4 their, advancing their understanding of atmospheric
5 processes, health related research issues, and so forth.
6 From the point of view of conducting health effects
7 studies, you probably are going to be looking at trying
8 to find populations of people that live within, you know,
9 a few kilometers of each of these supersites, and
10 they're not going to be looking at connections across
11 large geographic areas. On the other hand, from the
12 point of view of model evaluation, this is the
13 geographic area that people are working with. You
14 know, what can be done to try to use the assets that are
15 going to be created for the benefit of the community of
16 people that want to do source apportionment modeling
17 research. Yeah?

18 **SPEAKER:** That's not quite right,
19 Glen, because one of the high priority research needs
20 from both the Academy in an earlier workshop, is to
21 address the annual average standard, which can only be
22 addressed by long term cross sectional studies. We
23 know that won't be done, probably, there won't be a lot
24 of new data by the next evaluation of the standard, but
25 certainly by the one thereafter. So there certainly is
26 thinking in the agency, and I think outside that, that
27 some or all of these supersite platforms, those that

1 could be maintained for long term, would then provide
2 the basis for cross sectional data.

3 **MR. CASS:** No, the point I was
4 trying to make...

5 **SPEAKER:** That's one. So I think
6 you've asked a series of questions here, and I agree
7 that if we could break up these questions, you could
8 probably get consensus, but one question you asked is,
9 do you agree with the concept of an experiment versus
10 a place? I think there's pros and cons for both, but one
11 reason there may need to be some places that are
12 population based, where there's continual monitoring,
13 would be to, in other words, replicate the six cities
14 studies, only this time the six cities might be across the
15 whole west.

16 The other issue I think from a design
17 perspective that kind of gets at your question is this
18 issue of the relationship between the source receptor
19 data and the health data, and is the health data, is the
20 potency of particles with respect to causing mortality or
21 morbidity, the same in different air sheds? The first
22 data that went into the criteria document makes it look
23 as though there is. Well, if we test that hypothesis with
24 only supersites with similar air sheds, then we won't
25 really be able to test that hypothesis. In other words,
26 the placement of the supersites, I think, needs source
27 apportionment data to eventually directly link to the

1 health data, both in terms of characterizing the nature
2 of an aerosol and hopefully finding a way, I mean,
3 because the ultimate receptor are the humans that the
4 health people are trying to study. I don't think there's
5 a complete disconnect there.

6 **MR. CASS:** No, I'm just trying, what
7 I'm trying to do is to simply compartmentalize this a
8 little bit. We have two or three rooms full of people
9 downstairs who are talking about how can we construct
10 supersites and use those data for health effects
11 studies. What I'm trying to do up here is to find out,
12 can the air quality modeling community make use of
13 similar measurements for the purposes of verifying
14 physical models and tracer based models for source
15 contributions to the aerosol? If we don't start breaking
16 this thing down into smaller pieces, we're not going to
17 be able to provide detailed advice on exactly which
18 measurements are necessary for this purpose, and other
19 people downstairs are going to tell us what
20 measurements are needed for their purposes, I think.

21 **MR. SAXENA:** I think the only point
22 you're making is that do the studies but don't move
23 them around. Is that the idea?

24 **MR. CASS:** No, she's saying, she's
25 saying maybe if you put, let's put it this way. If we put
26 all of these sites in the middle of downtowns of cities
27 that all look the same, we might not see the range of

1 chemical constituents that produce a range of health
2 effects in a group of people. From a point, I can agree
3 with that. I think, however, that from the point of view
4 of model evaluation, we can have some sites in the
5 middle of courses, we can have some sites on the
6 outskirts of cities, and as long as we know where they
7 are and the models are making predictions for those
8 different areas, we should be able to track them against
9 those data. They don't have to all be downtown
10 corridors, and in fact, I wouldn't want them to all be in
11 the downtown of a city. Yeah?

12 **SPEAKER:** I want to ask a question
13 about what the locations of the subsidiary sites
14 because that's very important to all the variation of
15 such a domain, especially in the eastern United States
16 in which transport is very important. As I understand,
17 most of the speciated sites outside the supersites are
18 the campsites. Most of them are concentrated in the
19 northeast corridor. I don't believe that in the Newark,
20 New Jersey area, that site would be pretty good in
21 terms of doing model evaluation, but I don't know how
22 good it is in the southeast. Very few sites that have the
23 meteorologic data, and if you have a transport
24 situation...

25 **MR. CASS:** We're proposing to
26 install enough meteorological equipment to make
27 meteorological measurements that are necessary.

1 **SPEAKER:** In the subsidiary sites,
2 right?

3 **MR. CASS:** Yeah.

4 **SPEAKER:** How many are there in
5 the eastern United States? Do you have any idea?

6 **MR. CASS:** Ted, how many MET
7 stations do you use for your models in the southeast?

8 **SPEAKER:** I mean, we all do it on
9 the prognostic models, so whatever the prognostic
10 measure would be. There is a large number. You've
11 got all the airport data and such. Plus you're going to
12 have, coming on-line in about, maybe not the two year
13 time frame, most satellite data is going to start to come
14 in.

15 **SPEAKER:** Yeah, because most of
16 the meteorologic data used in, you know, the MET
17 model are for the weather forecast, which has a, you
18 know, the system has a scale of 2,000 to 4,000
19 kilometers, you know, assistance. So that's why, you
20 know, their data is basically, you know, trying to attack
21 that problem, which is much larger scale. But we're
22 talking about the air quality situation. It's a much
23 smaller scale. Obviously, the National Weather Service
24 Network is not good enough for the study.

25 **MR. CASS:** Look, let's take it as a
26 given that one of our recommendations is going to be to
27 be thoughtful about where we put the satellite stations

1 and to install enough meteorological support equipment
2 to support model use. I think at this point we're trying
3 to find out whether or not there's any need for a model
4 evaluation data set for the eastern half of the United
5 States. Is there any need for a model evaluation data
6 set in the air quality problems, let's say in California?
7 If there is a third generic area that needs to be studied,
8 where is that, and do we want to try to coordinate
9 measurements across half a dozen sites in the east or
10 do we just give up and say, forget it, we'll just have,
11 you know, six independent isolated local supersites that
12 are run by independent contractors doing their own
13 thing and you'll never be able to put the pieces back
14 together again? I don't think you want to do that.
15 Those are the choices. Yeah?

16 **SPEAKER:** Glen, the way we
17 phrased the question, gave the question is, will the
18 health sites be, the way I heard it phrased, will the
19 health sites be helpful for source receptor
20 relationships. Undoubtedly, the answer to that question
21 is yes. I think some of the charge to this group is how
22 do we want the sites set up from a source receptor
23 relationship, which is a somewhat different question,
24 and it could be that we want a boundary site rather than
25 an urban site. Now, the health people might want it all
26 urban sites, because that's where the population is, but
27 from a source receptor relationship, we may want

1 someplace out in Nebraska, just along the edge here,
2 that's going to give us that characterization coming in.
3 So I think that will affect the other part that that leads
4 to is, are the number of sites from a source receptor
5 relationship. EPA has said the number is four to seven.
6 I think that within this group's responsibility is, if we
7 think that that is an inadequate number to draw our
8 area, we need to state that.

9 **MR. CASS:** We're going to, what I
10 would like to do if I can, guys, the problem we're having
11 here is everybody has got good ideas on the random
12 problems and we need to put them in some kind of rough
13 order, and either we can, you know, try to let that
14 happen by accident or I can try to lead you to what I
15 think or what Pradeep thinks is the logical order that
16 simply gets answers to questions that are essentially
17 yes or no, or more or less, or this is impossible or it's
18 not. I don't hear any particular objections to the notion
19 of trying to coordinate across multiple sites. We didn't
20 discuss how many sites are necessary. Let's talk about
21 that when we get to the issue of equipment.

22 **SPEAKER:** In terms of your first
23 question about the need for coordinating across
24 multiple sites. I think the question I'm hearing is to
25 what end and would it really do what we need it to do?
26 For instance, as I've heard Frank say, the SCAQS
27 program, you had very intensive spatial distribution.

1 To get at your question of small scale variability. He
2 said that if we can do that on the eastern half of the
3 country, that would be wonderful. I don't think we're
4 imagining here that we're going to have that kind of
5 spatial coverage for sites, even combining the
6 supersites and the speciation sites. So I guess the
7 question is, if I can answer your question, do we need
8 to anticipate and the answer is yes, that we need to
9 have that related distribution of these supersites. Do
10 we need to have both the capability of perhaps doing
11 that on some very small scale cluster arrangement and
12 broad scale distribution? In other words, we need to
13 think about for perhaps the first two to three years for
14 several of these, we've had them on in just the
15 northeast corner of the U.S. and then after that period
16 of time, we might spread them out over much broader
17 ranges. Do the modelers need to have both those
18 scales?

19 **SPEAKER:** As a person who does
20 this sort of modeling, I personally would prefer the
21 larger geographic domain with broader spacing between
22 the stations. The reason for that is, if I were to cluster
23 all of these sites in one corner of the country, most of
24 the stuff that's going to matter to what's happening
25 inside the modeling community is going to be coming
26 across the boundaries of the model. If you want to look
27 at the effect of emission sources under quality, you

1 need to put the boundaries of the model out in the
2 areas of relatively cleaner air and relatively fewer
3 emission sources, and that's what the bigger community
4 does.

5 **SPEAKER:** So it would provide you
6 with tests you need then to be able to look at that.

7 **SPEAKER:** If I were limited to seven
8 sites, I would rather do something like this than to pile
9 them all up within 100 miles of New York City, then find
10 out that everything was going across the edges of my
11 modeling community.

12 **SPEAKER:** Okay, one last follow up
13 question. The follow up question to that would be, in
14 looking at our nesting, going from 36 down to 18 down
15 to 4 kilometer grids, is there not a part of that nesting
16 that we want to test with this design as well? To test
17 that much climb in grid scale, don't you need to have a
18 much more concentrated siting arrangement?

19 **MR. CASS:** The answer is yes, it's
20 going to be there. If you look at Atlanta and a number
21 of these other cities, they're going to have chemical
22 speciation sites that are the satellite ones, multiple
23 within a single domain. Factually, you're going to get
24 the type of intensity that SCAQS had. Plus you're going
25 to have all the other FRM type measurements as well.

26 **SPEAKER:** Then perhaps that's a
27 stated assumption, that I'd be able to answer your

1 question yes. That we can count on that as part of the
2 modeling question, that spatial translation or nesting.

3 **SPEAKER:** Your first bullet there,
4 behind the regional experiment. Are you asking the
5 question, what we've found with ozone is there's a local
6 component and there's a regional component. You've
7 got what's local in your area, and what's been
8 transported in. I guess, is your first bullet trying to ask
9 the question do we want to site these monitors so that
10 they can get at the regional component versus the total
11 component?

12 **MR. CASS:** No, what it's really
13 saying is do you want to design a large regional
14 experiment with coordination across a large geographic
15 area or do you want to have seven sites just set up,
16 taking data, with no coordination between them and no
17 plan to try to evaluate the effects of conditions in one
18 part of the country on the air quality of another part.
19 Without a plan for coordinating over something like the
20 eastern half of the United States, you're going to have
21 seven supersites that collect great data that are going
22 to be viewed in isolation to each other, and they will be
23 used to study only the local component of the air
24 quality problem. With a little coordination, you could
25 study the local component in the local areas where you
26 have those sites and the longer distance and larger
27 scale transport phenomena that connect those areas to

1 each other.

2 **SPEAKER:** I think that the
3 coordination is good. I think the mutual scale I can
4 accept. Then I go to the next step and that is, if I do
5 run the model on that scale, where do I need sites
6 located? Typically, I'll go, yeah, I need some urban
7 sites and obviously some rural sites, too, because if I
8 want to get to transport, I've got to have a bigger
9 picture. Then the question is if I say I needed urban in
10 a site, does that mean I need this intensive monitor
11 there or is the camp there or some other monitor
12 already there on site?.

13 **MR. CASS:** You'll notice that
14 Pradeep's plan has in it the elevated site which is some
15 aircraft data, too. So we need to get to those details.
16 We're not going to get there if we can't move beyond
17 this topic. So let me move on. It seems to me, at least,
18 that I hear that coordination across multiple sites is
19 better than no coordination at all and that if anything,
20 people would like to see more sites rather than fewer,
21 but they don't dismiss the need for a project of this type
22 in general.

23 **SPEAKER:** Glen, could I just try one
24 slight qualification? These are multiple sites and
25 multiple parameters, so ozone, for example, would be
26 considered in this analysis?

27 **MR. CASS:** Yeah, if you look, look

1 at the equipment list in the back, because we'll be
2 talking about that shortly. There's a full set of gas
3 phase and VOC monitoring equipment at all the sites as
4 well. The kind of aerosol processes models that we're
5 talking about testing are photochemical oxidant models
6 that have particle mechanics incorporated into them.
7 They are both gas and particle phase models.

8 **SPEAKER:** So is it fair to say we
9 won't be able to, the regulatory community won't be
10 able to address ozone, PM, and the regional haze
11 problem?

12 **MR. CASS:** That's the next point I
13 was getting to. The next point is, if we're going to put
14 out a network of stations for particle related
15 measurements, do we not want to address at the same
16 time a regional haze? You have size distribution. You
17 have chemical composition. You make epilometer
18 measurements and other like related measurements, you
19 could have a regional haze experiment as well. Is
20 everybody in general agreement that that would be an
21 intelligent thing to do?

22 **SPEAKER:** One brief point on that.
23 I think it's good for the ozone measurements, but for
24 the intensive studies, I don't think it's such a good
25 idea, because the zoning board, we have met with them
26 on that several times and we have not been cleared to
27 pursue that, so then we may not be able to go there in

1 this case.

2 **MR. CASS:** Well, there's presumably
3 a cause for visibility impairment. It is related to
4 particles. It may not be the highest particle
5 concentration time of the year. It may be the highest
6 pollutant time of the year, but we should be able to
7 understand that relationship, with high resolution
8 particle based measurements.

9 **SPEAKER:** Right, but the work
10 schedules may happen at different times.

11 **MR. CASS:** Well, let's look at what
12 time of year this ought to be done. In the back you'll
13 see Pradeep has laid out intensive experiments and
14 long term concurrent or continuing measurements and
15 there's no discussion yet of what time these intensive
16 measurements ought to be conducted. If there are any
17 recommendations to be made on that, I'd like...
18 Okay, so regional haze incorporated into the program
19 seems reasonable.

20 The next point down is really should we
21 incorporate both gases and particles into the
22 experiment and, you know, we just had that discussion
23 and I think the answer seems to be yes, unless anybody
24 objects. Now, there is a question of annual averaging
25 times. We basically have a fine particle standard that
26 the Office of Air Quality Planning and Standards tells
27 me at least is intended, or expected rather, to bind on

1 the annual average fine particle standard. Yet, most of
2 the models for source apportionment that are
3 mechanistic aerosol processing models try to simulate
4 evolution of transport of gases and particles, are most
5 suited to episodic tests of their performance, episodic
6 applications. This means periods of several days in
7 succession. Yet, the air quality standard is more
8 defined on the annual average. So something needs to
9 be done in this program to make it possible to conduct
10 evaluations of annual average measures of air quality
11 relationships. There seem to be two ways to do that.
12 One is through receptor modeling and chemical tracer
13 based techniques that are adaptable easily to either
14 very large numbers of days to be averaged or that you
15 can average the aerosol properties and perform the
16 annual average on that basis. The other thing is
17 there's a possibility of producing aerosol transport
18 reaction models that with some more development could
19 operate over a period of as long as a minute. Bill?

20 **SPEAKER:** One point of
21 clarification. I think you should think in terms of
22 receptor models as being more than sensor tracer data.
23 We can use the spatial variability. We can incorporate
24 meteorology, so there are a variety of ways that we can
25 skin the cat.

26 **MR. CASS:** Yeah, but basically we
27 are trying to say do you agree that we should have, the

1 SCAQS experiments were episodic experiments that
2 occurred on a couple of occasions for a few days and
3 that was it. There was no underlying annual program
4 covering the year 1986 or '87, '87 in Los Angeles. Do
5 we want to avoid that situation or do we want to have an
6 ongoing annual program that is coincident with a short
7 term episodic measuring program?

8 **SPEAKER:** There's one other way
9 we can potentially do that is, if we can classify the
10 meteorology into some limited number of regimes and
11 then potentially then take appropriate weighted
12 amounts of samples in those regimes and thereby create
13 an effective annual average. You're making some
14 assumptions, but there may be ways of cutting down the
15 total number of samples in a way that still makes
16 reasonable sense.

17 **SPEAKER:** So what you're saying is
18 we have to allow room for both, not just one or the
19 other.

20 **SPEAKER:** We know darn well that
21 if we try to set that up, that Mother Nature will spring
22 us a curve.

23 **MR. CASS:** One thing that could
24 potentially be done if you have to save money, would be
25 to go collect the samples regularly over a year and
26 analyze chemically those samples that met certain
27 meteorological criteria. You could do that as a cost-

1 saving device. But, anyway, I don't hear any
2 disagreement that we should be trying to address
3 annual average source receptor relationships, not just
4 very short term model evaluations, because the
5 standard is going to be relying on that annual average
6 in most places.

7 Next, there is a general underlying premise
8 that, well, basically the matter of trying to work both
9 inside and outside in southern California. Do people
10 see a need for both west coast and east coast or
11 eastern half of the U.S., as opposed to western U.S.
12 components to this study?

13 **SPEAKER:** I was waiting to see if
14 the draft ended in Z.

15 **MR. CASS:** Okay, let's ask.
16 Conceptually, I can identify there are major model
17 development evaluation projects already underway that
18 looks approximately like this, and likewise major model
19 development evaluation projects over this system that
20 covers this area over here. Where else in the country
21 is it likely to be the case that people are going to want
22 to test advanced models for the first time?

23 **SPEAKER:** Seattle, Vancouver.

24 **MR. CASS:** Seattle, Vancouver.

25 **SPEAKER:** I have a conceptual
26 problem.

27 **MR. CASS:** Yeah.

1 **SPEAKER:** This group, as you have
2 said, is sort of the source apportionment. There are
3 other groups downstairs worried about health, and we're
4 going to bring their considerations, and by the way,
5 there are health people here, and that was intentional,
6 so we don't wander too far afield. But, at any rate, as
7 we think about source apportionment, I think it is more
8 than, for instance, the emissions based modeling or the
9 observation based modeling. I get to emissions
10 inventory kind of question. In other words, if you're
11 making observations and you're making observations
12 about aerosol, then you want to know where did they
13 come from, what are the continuing sources, you get to
14 that question through more than just models. So we
15 have emissions inventory purposes here you want to
16 affect, as well. For instance, in the northwest there is
17 a very large hypothesis that says a lot of the aerosol
18 issue there and perhaps the health issue, is wood
19 smoke based. We need to test that question, and I
20 think...

21 **MR. CASS:** Do you need a supersite
22 to test that is the question.

23 **SPEAKER:** Maybe that is the
24 question. But, or those kinds of issues.

25 **SPEAKER:** If the focus is on
26 comparing annual averages, I would argue that both
27 Seattle and Vancouver areas have a total chemical

1 component, although it isn't as dominant as perhaps
2 another part of the country is and the models aren't as
3 far along, but they are under development and in the
4 works.

5 **MR. CASS:** I mean, you can draw a
6 box around the whole country. The question is where
7 are people, in reality, going to actually be prepared to
8 do the kind of data analyses that we're talking about
9 here, and my experience has been that those analyses
10 are going to get done in those parts of the country that
11 have at least part of the infrastructure needed with the
12 remaining parts of analysis in place. So I looked at the
13 places that have high resolution, gridded initial
14 inventories, at least under development, and modelers,
15 and people who are actually building and exercising
16 models of the kind of sophistication we're talking about,
17 over those areas. Yeah, well, I've got, Pradeep and I
18 also put a little star over here on either, it could be
19 Denver or Utah Valley. I don't know what the modeling
20 community looks like around there, but if I had done
21 some more research maybe I'd have a better idea.
22 Yeah?

23 **SPEAKER:** You touched on it a
24 little bit, but I wanted to comment on it, but if you put
25 two-thirds of the U.S. population in a box, does that
26 imply that we are full of running models, that we have
27 some sense of emissions inventory for that two-thirds of

1 the U.S., as opposed to some area that's, you know, you
2 can get a great model of the big regions very nice, but
3 what would we put in as the endpoint for this inventory?

4 **MR. CASS:** I think that at the level
5 that we are discussing here today, it would be
6 understood that if we wanted to try to support modeling
7 over this domain, somebody would have to make a
8 commitment to do emissions inventory for that domain
9 as well. I've seen two or three large scale modeling
10 efforts attempt to work over that domain. I believe that
11 that set enough of a pattern that the emission inventory
12 improvements generally refer or would refer back to
13 that. The reason for that is because we need to get in
14 the relative requirements. If you don't do that,
15 basically, guys, you can polish up the emissions
16 inventory eternally with a small grid and be very
17 pleased with what you know about what's going on
18 inside that grid. Unfortunately, you go into modeling
19 and find out that 50 percent of your pollution problem
20 leading you elsewhere, and you now know zero about
21 what happened. In order to avoid that problem, you've
22 got to make the air shed study conform to the location
23 of the sorts of chemical properties. Yeah?

24 **SPEAKER:** That's true in the
25 present setting that we have to meet the advanced
26 standard and that will be true for the next 10 years or
27 so. But, it's certainly possible that the list of health

1 based hypotheses that Joe Mauderly put up this morning
2 include some that would not involve long range
3 transport. What was killing people in each city would
4 be nearby emissions of ultra-fines or metals, and so in
5 that sense, your assumption, well, it seems to me our
6 focus on this huge domain is sort of shaped by our
7 assumption that we're talking about sulfates at least,
8 which is maybe half due to mass and we all know that
9 that is spatially pretty uniform. And the mass is
10 spatially uniform. But it's not necessarily the case that
11 the biological agents are uniform on the same scale,
12 and that has implications for the source apportionment
13 method.

14 **MR. CASS:** You know, the modeling
15 results in Los Angeles don't show a uniform receptor in
16 aerosols. They show about half primary, half secondary
17 stuff, and the same thing is going to happen here. The
18 models that are going to produce predictions over that
19 big region are going to produce predictions and say
20 that half of this stuff is due to what's going on in this
21 city alone and the other half is flowing in from outside
22 and the problem is that you're not going to be able to
23 have enough money to put supersites in every
24 population center in the eastern U.S. in order to study
25 that local problem in isolation. The models that seem
26 to work well in half-a-dozen locations might be trusted
27 to make not so accurate predictions in those places

1 where you don't have a monitor to check them. But, I
2 don't see how you're ever going to put out 100
3 supersites.

4 **SPEAKER:** Well, I'm not suggesting
5 that. But, I'm saying that if it should turn out, for
6 example, the ultra-fines are the active agent, we're not
7 going to learn anything, you don't need to understand
8 what's going on in Framingham or New York. You're not
9 going to profit by knowing what's going on in Atlanta.
10 They're not getting transported.

11 **MR. CASS:** If it turns out to be the
12 case that ultra-fines are the problem, it may turn out to
13 be a very localized situation. The haze problem, on the
14 other hand, we know that is widespread, so if we want
15 to understand what this really means, this dimension is
16 unassailably the dimension we want to be looking at.

17 **SPEAKER:** Right, and it's the
18 dimension for the foreseeable future as long as we've
19 got a mass standard.

20 **SPEAKER:** I think this also applies
21 to the supersite and the whole FRM measurement.

22 **SPEAKER:** But you can deal with
23 the local problem by looking at the time series. These
24 supersites are going to have high resolution data and
25 the variation of time and wind direction, et cetera, is
26 going to help you explain the locality of the problem.

27 **MR. CASS:** You don't lose anything

1 by looking at the bigger picture and you've still got the
2 highly localized information if it turns out to be the
3 case that that's what you need.

4 **SPEAKER:** You've got highly
5 localized information, but perhaps haven't situated your
6 supersites next to any particularly bad sources, so
7 the....

8 **MR. CASS:** I think that's another
9 question to be addressed. Where do you exactly put
10 those sites?

11 **SPEAKER:** It seems to me that for
12 the purposes of model verification, you need a large
13 number of measurements that you've listed. But for
14 elucidating the health studies, long term, speciated
15 information alone isn't going to be quite enough and so,
16 I'm asking the question, is there something in between
17 that can slightly supplement speciated information,
18 which can add to that part of the need without having to
19 go all the way toward...

20 **MR. CASS:** What kind of information
21 are you talking about?

22 **SPEAKER:** Well, the hypotheses
23 that are listed in the 10 hypotheses, they're not part of
24 the standard speciated elements that they compose, so
25 acidity, soluble or trace metals, that kind of thing.

26 **MR. CASS:** Okay, there's nothing
27 about the design we're talking about here that

1 precludes additional supplemental information. What
2 I'm trying to simply get on the table is as a minimum,
3 what do we need for source apportionment work? The
4 guys that are doing the discussing of how to design
5 health studies around the supersite will come back with
6 a list of equipment, hopefully, for what does it take to
7 do a health study. Then we're going to lay the two sets
8 on top of each other and find out what has to be added
9 to make the whole add up all the way around. If we try
10 to design health studies in this meeting, we're going to
11 be duplicating three other meetings downstairs and
12 we'll never get done.

13 **SPEAKER:** The other point is all the
14 things that you are applying today, everything is
15 included in the list, and then you have a separate
16 biological. You're suggesting that maybe adding more
17 things to the supersites.

18 **MR. CASS:** You may find that almost
19 all of them are already there if you look in detail.

20 **SPEAKER:** Speciated network?

21 **MR. CASS:** No, no. Look at page...

22 **SPEAKER:** I agree that the
23 supersites have all the measurements you need for
24 the...

25 **MR. CASS:** But put ultra-fine
26 particle monitors at each of the satellite stations,
27 you're talking about tens of thousands of dollars of

1 extra money for the satellite stations. That's fine.

2 Okay.

3 **SPEAKER:** I was just going to sort
4 of mention it seems to me the way the session is going
5 now, that it seems to me that a lot of what you're
6 describing having to do with the supersites leads to
7 more intensive study type things and not necessarily
8 long term type things, whereas having the speciation
9 network, many of the sort of long term annual things are
10 going to be reserved for annual as it is, but what's
11 lacking in that right now is perhaps ultra-fines, their
12 test of the hypothesis. Whether or not we have a lot of
13 sites with the ability to do that is a big question. But
14 what else is lacking right now at this point is resources
15 to gather data, which is important to health studies, so
16 I think what we need to consider is perhaps we don't
17 need as many supersites burning all the time, but
18 you've got the speciation network, you can get the data
19 in there, that may be what's important.

20 **MR. CASS:** Let's just take a quick
21 public opinion poll here. From among the people in this
22 group, what is the reaction to his suggestion that you
23 would reduce the number of supersites and/or their
24 capability as a trade for daily monitoring at the
25 speciation network? In other words, more spatial
26 coverage, less physical detail on the part of those more
27 frequent...

1 **SPEAKER:** Now, the reduction
2 you're saying in the supersites is in terms of the
3 number that you'd maintain running at any one time?

4 **MR. CASS:** All right, in other words,
5 to make the supersites operable only during intensive
6 monitoring periods?

7 **SPEAKER:** Not all of them, but...

8 **SPEAKER:** You know, if you just do,
9 you know, all of them are intensive. At different
10 locations you have a different intensive period, so if
11 you're doing your thing, he's still doing his, so what are
12 you going to do with the data?

13 **MR. CASS:** Well, that's a problem
14 when we're talking about intensives.. Most of what I've
15 been hearing has been steered toward model evaluation
16 and that includes the model of doing intensive
17 research, and that consists of tremendous variability.
18 There'll be some supersites where there are regions
19 that have a greater emphasis than other areas. But, it
20 fits more towards having a real intensive program for
21 that goal of getting weight sensitive models.

22 **SPEAKER:** I think one of the things
23 you're lacking most is long term effect. We spend far
24 too much money on answers and far too little data on
25 long term effect.

26 **MR. CASS:** Well, he was sort of
27 saying, forget taking day in and day out measurements

1 of particle size distributions, number counts, you know,
2 things of that sort. Instead, get every day filter based
3 24 hour average speciation models, which was a
4 different kind of approach.

5 **SPEAKER:** I think that certainly it's
6 a question of numbers. I certainly wouldn't want to cut
7 that out entirely. There needs to be in at least the
8 three or four major regions, that kind of detail on a
9 more continuous basis because I think that there's a lot
10 to learn there.

11 **MR. CASS:** Maybe we can treat this
12 as, very interesting questions. One is, how frequently
13 should the nation's speciation modeling program be
14 conducted? If they decide to go every other day or
15 every day on the 300 stations monitoring nationally or
16 50 stations monitoring nationally, the need would
17 probably be met. You know, Bill was asking before, he
18 was saying at least at a couple of locations in the
19 country, we ought to be able to get high resolution
20 particle size and composition data more or less
21 consistently to find out what those data look like
22 because we just don't have an idea right now.

23 **SPEAKER:** I agree with that, but I
24 was saying let's not do away with the regular sites, but
25 again, augment. Again, for intensive monitoring, you
26 need to have more, but not all the time.

27 **SPEAKER:** Glen. Just an

1 observation that having been involved in a number of
2 health studies, we're looking not at less monitoring, but
3 we're trying to find that missing link. That is, we don't
4 know, and at this point in time, you could drop anything
5 out, maybe drop something out that we really need to
6 know about. Try to make health studies on global
7 population and types of species that may be dying. I'm
8 not sure we can recommend what to drop out at this
9 step of the game.

10 **MR. CASS:** One thing I would
11 mention to you, many of you may not have been looking
12 at what's happened in Europe, but there's a monitoring
13 program going on in Europe, where very high resolution
14 particle number distributions, size distributions,
15 impactor measurements and so forth are being made,
16 for example, as part of an epidemiologic study designed
17 specifically for the purpose of studying health effects,
18 and the design of those monitoring, that monitoring
19 station, looks so similar to what we're talking about for
20 the supersites here that I think a large number of the
21 people in the health effects community will be standing
22 up on their table, cheering that they have seven sites
23 like that in the U.S. Because others are using those
24 high resolution data to break new ground on whether or
25 not ultra-fine particles are an issue or whether or not
26 trace metals in small particles are an issue and so
27 forth. You're not going to get that kind of resolution

1 out of a speciation model as they're intended,
2 principally for supporting SIP development.

3 **SPEAKER:** I thought the speciation
4 monitor would do trace metals and organic carbon.

5 **MR. CASS:** But they're not going to
6 give you the size distributions of the trace metals,
7 they're not going to tell you what the ultra fine is in
8 your concentrations, which is obtainable from the
9 supersite measurements. Right. Okay, we need to keep
10 moving down to the next bullet.

11 **SPEAKER:** We also want to know
12 how much concentration is taking place.

13 **MR. CASS:** Bill, you had a
14 comment?

15 **SPEAKER:** Yeah, I mean, that
16 certainly the upper level meteorologists, you know,
17 when you see how little the SCAQS aircraft data seem
18 to ever be incorporated and in a number of other cases,
19 how little the aircraft data has been incorporated, I
20 really wonder how much, how much it's going to get
21 used. The ground based people often don't ever look at
22 the aircraft data, and the aircraft data people don't
23 seem to ever do well to merge in the other direction. I
24 really wonder how much utility it's going to have.

25 **SPEAKER:** You really have to
26 characterize. I mean there's enough stuff that goes on
27 in the Gulf Coast, you can take a few stiff conditions

1 and transport them overnight to St. Louis, and you can
2 see that in the surface, because it's done quite readily,
3 and so you really have to characterize the upper parts
4 of the PDL and perhaps even up into the atmosphere,
5 because you're going to have some coupling effect, on
6 the off day that PDL will penetrate.

7 **SPEAKER:** Right, so I'm saying that
8 the ground based meteorological data, which will help
9 us do that. The question is, so I think part of it we
10 need, but the question is are aircraft going to
11 necessarily find what you want...

12 **SPEAKER:** That's the problem.

13 **SPEAKER:** I'd like to say that, at
14 least now, we're reaching a point where there are some
15 aircraft capabilities that essentially almost represent a
16 flyable supersite in terms of the number of different
17 species that can be measured and, in essence, what
18 these things can do, what they can do is look more at
19 the regionality of this problem in an intensive type
20 period and by using that to begin to knit this large
21 domain together, the careful use of coordinated aircraft
22 program with your ground based program might be quite
23 valuable.

24 **SPEAKER:** Well, I bet I'm one of the
25 few people in this room who has actually looked at,
26 worked with a fair amount of aircraft data and it's
27 terribly ad hoc and labor intensive and terribly hard to

1 merge with the ground based data. So I think Bill is
2 right. Historically, it is just the case that it often
3 doesn't get utilized and I can cite several big studies
4 where money spent on aircraft for all the right reasons,
5 that at the same time, Frank and Christian are exactly
6 right that you need to know what's going on up there. I
7 would suggest one thing that I don't see on your list is
8 ground based LIDER so there's something to measure
9 the height of the particle wave. Since we are talking
10 about particles, you can use that, and just that third
11 dimension would allow you to bring in lots of receptor
12 oriented techniques that you do not presently derive on
13 the regional scale because there's too much variability
14 in mixing them.

15 **SPEAKER:** With regard to the
16 aircraft, I think there's a proposal to do some for the
17 supersites. I think initially aircraft is important, should
18 be coordinated, should be worked with. There are a
19 number of different entities that have ability to put
20 money in aircraft work. I think I ought to make clear
21 that our committee would recommend supersite money
22 to the aircraft, strongly recommend the use of aircraft,
23 in conjunction with analysis in the supersite program.

24 **SPEAKER:** Yeah, if NOAH or ACOG
25 want to put up the money to fly the aircraft, that's
26 great. That's increasing the pot. The question is
27 whether to divide the pot or not.

1 **SPEAKER:** There's another party to
2 this, too, NASA.

3 **SPEAKER:** That's one of the other
4 people who looked at aircraft data. You have to be
5 extremely careful in how you design the program so that
6 the data gets interpreted. I think that adds another
7 dimension to the discussion.

8 **MR. CASS:** Now, we've pretty much
9 covered, the last point here is that the document that
10 Pradeep and I have put together presumes that in
11 addition to the mechanistic source oriented models,
12 there should be the use of receptor oriented modeling
13 techniques. Broadly stated in the way that Bill did, that
14 can be applied based on development, composition
15 meteorological measurements that are being made. We
16 would hope that when we get to the measurements that
17 are going to be made, that people are thinking both
18 about their time series issues and verifying that they
19 are good models, but also whether or not the species
20 that are being measured are the correct ones and the
21 meteorological measurements that are being made are
22 the correct ones from the point of view of emphasizing
23 receptor based models. Now, I don't know that we really
24 need to pay a whole lot of time to the list of major
25 science questions. Most of these have to do with...

26 **MR. SAXENA:** What was asked of us
27 to do?

1 **MR. CASS:** Yeah, basically that's
2 why we're here. We're trying to be able to answer
3 questions about the mechanism by which particles are
4 formed and transported, the effect of the emission
5 sources on the receptor sites, the spatial scales over
6 which the problems are observed. Most of these are the
7 kind of questions that we'll have to ask once the
8 measurement program is in place. We'll come back to
9 any of those questions if we need to, but I would like,
10 yes?

11 **SPEAKER:** I have an ancillary issue
12 that I'd like to bring up before we leave the principles
13 completely behind?

14 **MR. CASS:** Sure.

15 **SPEAKER:** We kind of went past the
16 third bullet on Page 15 pretty quickly. Of course there
17 are two standards for particulate matter, both of which
18 were chosen by EPA apparently because they show
19 health effects. I wondered if there's any possibility on
20 the instrument list, if one of the supersites could
21 address all particulate matter under 10 with the same
22 complement of particle measurements. Otherwise, I
23 think if we don't measure those effects, it's sort of a
24 self-fulfilling prophecy that we probably won't find any
25 new health effects. So, I don't know, I think that's
26 likely a western site somewhere.

27 **MR. CASS:** It's entirely possible

1 that there is material lurking above two and a half
2 microns in diameter. It's a problem. In my research,
3 we're spending a fair amount of time looking at, you
4 know, the larger than 10 micron aerosols and even the
5 biologic. There are a lot of allergens out there. Sure,
6 I think maybe we should consider seriously looking at
7 what's happening in particles that are bigger than the
8 fine particles and that's probably something we need to
9 look at. Yeah?

10 **SPEAKER:** Well, not only that. You
11 know, the distribution of particles from a particular
12 source, like gold dust or whatever, doesn't magically
13 stop at 2.5 and understanding the coarse fraction will
14 actually help you understand the fine fraction.

15 **MR. CASS:** Well, I think that point
16 is well taken. Is there anybody who objects to the
17 expansion upward in size? Now, let's take a look at the
18 question of experimental design, which begins on Page
19 17. First issue is what is the duration over which the
20 source receptor reconciliation community would like to
21 see this data set unique, and Pradeep and I have
22 nominally proposed a multi-year, being two to three
23 year experiment. That doesn't mean that the supersites
24 shut down at the end of three years. What it means is,
25 we thought it would be a good idea to try to have a
26 three year period of observation, to take a look at the
27 data analysis process here. There are people who have

1 come up to me today and said, look, we really only need
2 one annual period. The reason why Pradeep and I
3 suggested more than one annual period is because of
4 the meteorological variability that occurs.

5 **SPEAKER:** One year effects.

6 **MR. CASS:** What? Oh, the annual
7 standard is a three year standard, too. Thanks for
8 reminding me of that. Yeah?

9 **SPEAKER:** One year is fine if you
10 can guarantee that I get an average year.

11 **MR. CASS:** Right, well, we just had,
12 last summer there was, where is Bart? How much money
13 got spent on SCAQS '97, Bart?

14 **SPEAKER:** Seven million.

15 **MR. CASS:** Seven million dollars on
16 El Nino and people were assured when they got to .15
17 EPM ozone last summer in L.A. It only happened once
18 or twice. It's possible to get entirely wiped out by the
19 weather during a particular year. So unless we know
20 ahead of time what the weather is going to do, you'd
21 better be prepared to be operating more than a year.

22 **SPEAKER:** One of the things,
23 though, when you're dealing with a standard, it's not
24 just the acute standard, we need to understand those
25 non-acute episodes as well. So we shouldn't look at it
26 as a loss for the models. The models need to do that as
27 well.

1 **MR. CASS:** So if we're looking at a
2 multiple year umbrella over this kind of program, it's
3 then broken down into measurements that would occur
4 more or less consecutively throughout that period at
5 some moderate level of intensity called the annual
6 program or yearly program. Then, on top of that, the
7 selection of a number of episodes, which are periods of
8 time when monitoring intensity be cranked up to try to
9 get as much out of the system in terms of temporal
10 resolution as is possible. The question is, how many
11 such intensives and how long do they need to be nested
12 within this multiple year period of continued
13 observation?

14 **SPEAKER:** Before you address that,
15 I want to also make sure that these intensives come
16 other than summer time. It's all very nice to get the
17 grad students out in the field when they don't have any
18 TA courses, but, you know, it's really going to be
19 important that we recognize the seasonality differences
20 and we get intensives, you know, whatever frequency
21 we want to set them up at. We've got to look at the
22 middle of winter, as well as in the summer.

23 **MR. CASS:** Let me ask you, if you
24 had your wishes, would you be trying to do receptor
25 modeling off the data from the intensive experiments or
26 lots of time resolution, size and composition data or
27 would you be most interested in operating off the

1 continuing measurements at a lower level of resolution
2 that go on and on and on for years at a time?

3 **SPEAKER:** I would tend to be
4 looking at the longer continuous data.

5 **MR. CASS:** So, frequency of the
6 intensives would be less important for your purposes?

7 **SPEAKER:** I think so.

8 **MR. CASS:** For someone, Ted, for
9 example, and other people, people who are actually
10 going to be doing grid based type modeling. How many
11 intensive episodes would you even want to think about
12 looking at and how should they be distributed around
13 the year?

14 **SPEAKER:** What we want is actually
15 enough episodes that we can dig up and call it an
16 annual year. It makes sense, and doing on the order of
17 10, 10 day episodes is rather viable at this point.

18 **MR. CASS:** So you would say 10, 10
19 day episodes? That's 100 days out of 365 days of the
20 year.

21 **SPEAKER:** As was said, we don't
22 have to do it all in one year, but I'm just saying that's
23 becoming viable at this point. Maybe we don't need it
24 to get an.. What we want is something that scientifically
25 is credible in getting an annual average, so we do, so
26 we stress the model over the type of meteorological
27 periods that are important, and so actually we probably

1 only need on the order of two-thirds of that research.

2 **MR. CASS:** I think that cost is going
3 to become an issue at some point and if you had to
4 trade numbers of episodes or length of episodes off
5 against each other, which would you prefer to do? In
6 other words, 10 three day episodes are more valuable
7 than three 10 day episodes? What's the minimum
8 length of an episode in the eastern U.S.?

9 **SPEAKER:** Five days.

10 **MR. CASS:** Five days is the
11 minimum amount.

12 **SPEAKER:** The thing is, we're
13 always going to have all the other ancillary data coming
14 in so, in some ways, it's not as though the experiment
15 ends just with the intensive whatever, aerosol
16 measurements, because you're still going to have all
17 the other standard aerosol studies, so it's not, in some
18 ways, having a shorter period than we actually are
19 modeling. It's probably still going to test out over a
20 longer period.

21 **MR. CASS:** Would you want those
22 things spread uniformly around the year or how would
23 you, ahead of time, assign dates to those experiments?

24 **SPEAKER:** What we want is how
25 they contribute to sort of, the theory is an interesting
26 one. Probably a few where it's very clean and then
27 mostly where it's going to be contributing most to your

1 annual average and where you have the best chance of
2 deciding which sources are adequate.

3 **MR. CASS:** What you're saying is a
4 prospective study to analyze historical data to find out
5 how to place those episodes logically on the calendar?

6 **SPEAKER:** Yeah, and the reason
7 why we want a clean one is that sort of creates stress
8 for the model.

9 **SPEAKER:** We've been talking 10
10 day. How about five?

11 **SPEAKER:** Five is when you start
12 looking at the transport through the domain and getting
13 initial conditions.

14 **SPEAKER:** Wouldn't you need at
15 least 10 days to do that?

16 **SPEAKER:** Yeah, that's the spin off
17 before you start the work pattern.

18 **SPEAKER:** Yeah, so that's spinning
19 out. That's sort of on the way anyway.

20 **SPEAKER:** So you're thinking eight
21 days...

22 **SPEAKER:** So you have five days
23 initially.

24 **SPEAKER:** You wouldn't be making
25 comparisons within the model and observations over a
26 three day spin off period. You'd start the model up, get
27 the air moving and then pick up with a model evaluation

1 on day four.

2 **SPEAKER:** Bill, I look at the data
3 in the past 10 years, I find out the episodic base in the
4 eastern United States, falls 60 percent of it in the
5 summer, which is quite different from California, so
6 there's a geographic difference there.

7 **MR. CASS:** Frank, what about
8 numbers of episodes and new episodes?

9 **SPEAKER:** The way I think about it,
10 I'd like to see cold season, warm season and
11 transitional seasons, spring and fall, to get data
12 essentially representative of a year. Warm season
13 heightens certain factors, as does cold season. In the
14 transitional seasons, especially in the spring in Reno,
15 you want to work that. First off, you have agricultural
16 applications, you want to get some sense of that, and
17 in the fall, you want to find out if there's any kind of
18 biological thing there. So warm season, cold season
19 and the transition seasons should be done. That's just
20 what I think.

21 **MR. CASS:** What about the numbers
22 of episodes?

23 **SPEAKER:** I would agree with Ted.

24 **MR. CASS:** On the order of 10?

25 Let's ask the question differently. How much time and
26 resources are likely to be available for actually
27 processing and modeling the data base collected?

1 There's been a history in this country, we've collected
2 lots of ambient measurements that never see the
3 outside of a shoe box because there's not enough time
4 available to evaluate the measurements or to use them
5 for anything in particular.

6 **SPEAKER:** I've made a comfortable
7 living for 20 years analyzing this data.

8 **MR. CASS:** Ted, if you had 10
9 episodes of five to 10 days duration each, do you
10 conceive of ever getting enough money and enough
11 resources and manpower to actually run them all?

12 **SPEAKER:** We're currently doing it.

13 **MR. CASS:** Okay, so the answer is
14 yes. Frank?

15 **SPEAKER:** We just hope the
16 sponsors keep paying for that sort of thing.

17 **SPEAKER:** We keep being
18 reassigned to do something new, so I think that it would
19 be, it would have to be a very strong mandate to look at
20 this data. Now, having released model 3, we want to do
21 evaluation. We're going to do studies and see what we
22 can gain. The question here is, I've been thinking
23 about characterization, as well as modeling, and I see
24 them as separate access to the same thing.

25 **MR. CASS:** Yeah, you realize that's
26 a very hard question. That's a management question,
27 you know, will management give us the time and the

1 resources to do this properly.

2 **SPEAKER:** We also have to
3 remember, we're dealing with the annuals for PM
4 investigation, so it seems to be working.

5 **SPEAKER:** My only comment would
6 be that there ought to be some commitment that each
7 one of those 10 episodes gets analyzed. We shouldn't
8 just be looking at the two or three that are, quote,
9 interesting.

10 **MR. CASS:** The reason why I'm
11 posing these questions is because of all the data
12 collected during the SCAQS, there have probably been
13 less than four episodes that have ever been looked at
14 and probably two-thirds of the effort has gone into one
15 of them. So, you know, yeah?

16 **SPEAKER:** Well, the discussion is
17 at least 10 percent of the resources made available for
18 supersite measurements is going to go into supporting
19 analysis. Learning from that lesson.

20 **MR. CASS:** But, no, here's the
21 problem. 10 percent of the cost of the supersites
22 program going into analysis is completely inadequate to
23 analyze that much new data. If you're not prepared to
24 commit about an equal amount of money to go to
25 analysis as data collection, you're going to collect more
26 numbers than you ever look at.

27 **SPEAKER:** By a lot.

1 **MR. CASS:** By a lot. That's the
2 lesson we've learned from 20 years of looking at these
3 EPA studies. The SCAQS experiments, for example,
4 took a year or so to conduct, another year or year and
5 a-half to get out of the laboratory and they're taking the
6 next seven or eight years to analyze.

7 **SPEAKER:** You just said you need
8 to have equal devotion of resources to those two
9 questions, gathering information and analyzing
10 information.

11 **MR. CASS:** Right.

12 **SPEAKER:** That will definitely limit
13 the number of locations.

14 **MR. CASS:** Yeah, well. Either that
15 or it requires contributions to the data analysis from
16 pockets other than those from the number of supersites.
17 But, the fact of the matter is if you devote 10 percent of
18 the money to have analysis of the data, most of the
19 numbers will never see the light of day. They will never
20 be looked at by anybody ever because there won't be
21 enough money.

22 **SPEAKER:** Coming up with an
23 estimate is very helpful.

24 **SPEAKER:** Question. The funding
25 request was five centers. They take care of a lot of the
26 analysis because presumably a lot of those...

27 **MR. CASS:** Yes?

1 **SPEAKER:** I just want to make a
2 suggestion that since what we're looking at is more of a
3 trying to sort out this issue about when to do
4 intensives, good discussion about, you know, when to
5 do them specifically and how long they should be.
6 Maybe if we did some climatological typing to help us
7 understand how to even orient the numbers for a given
8 supersite or collection of supersites. I think that would
9 be really helpful because it looks like model 3 is
10 already going in that direction, where you need to
11 account for how frequently something occurs.

12 **MR. CASS:** Yeah, what I said sort of
13 in code in response to what Ted had said was, oh, well,
14 you mean we need a special study to determine, you
15 know, how to time the intensives? That's what will have
16 to happen. Someone is going to have to undertake a
17 research project to determine, based on the
18 climatologies of these areas, when to time the
19 intensives.

20 **SPEAKER:** That's even more useful
21 for regional haze purposes. It's a much longer time
22 series.

23 **MR. CASS:** Yeah.

24 **SPEAKER:** Question on the same
25 point. Are we in any way implying that some number of
26 the supersites, because they are going to be intensive
27 oriented, might be moveable? In other words, have

1 more than our seven locations?

2 **MR. CASS:** I think that, my gut
3 feeling is, it's going to be so hard to get these sites in
4 place and to get them up and running and producing
5 quality data, that if you try to tear them down and move
6 them around, you disrupt the operations to a point
7 where you generally lose value.

8 **SPEAKER:** So once they're put
9 there for two to three years, they're there?

10 **MR. CASS:** Yeah, they're there and
11 the effort should be spent on trying to crank quality
12 data out of those locations, which requires systematic
13 break in and polishing them a bit.

14 **SPEAKER:** I've heard raised the
15 question of this two or three years as an upward
16 number. One of the cost cutting issues that we had this
17 morning was accountability, and certainly one of the
18 receptor modeling applications of a long series of data
19 is to look at the effects of controls or change. Not
20 necessarily controls, but new kinds of diesel engines be
21 monitored, but all sorts of things change over an time
22 scale of years and some of those things might show up
23 only in parameters that are going to be measured at the
24 supersites, like ultra-fine.

25 **SPEAKER:** As I've heard that,
26 they're talking about the speciation network as being
27 something of a 10 year viewpoint and it seems to me

1 that you need the supersites as the anchors to the
2 speciation network, and therefore they need to have a
3 similar duration to the speciation.

4 **MR. CASS:** If you have unlimited
5 amounts of funds, I'm sure that that would not be a...no
6 one would question that that was a good idea. Maybe
7 we do have enough money to run the speciation models
8 for a decade. Excuse me, the supersites for a decade.
9 Maybe something like the PAM stations, where you set
10 them up and they're running continuous GCs, and maybe
11 that's possible. Does anybody from the EPA have any
12 idea about the likely maximum duration of these sites?

13 **SPEAKER:** There's a serious
14 possibility that they will be potentially long term.

15 **MR. CASS:** So, maybe we should
16 recommend the long term existence of these sites, but
17 at least insist that we get enough data to cover a three
18 year period with enough intensity to make useful model
19 evaluations.

20 **SPEAKER:** I would recommend
21 continuation of the non-intensive stuff as well.

22 **MR. CASS:** You can't take four hour
23 consecutive filter samples forever. You would collapse
24 out of exhaustion if you do that, but you could keep the
25 basic program running indefinitely.

26 **SPEAKER:** In giving support for the
27 long term funding, it'd probably be good if those first

1 two to three years would be able to show results
2 through modeling and analysis of data. So I think the
3 point that you made earlier that you needed to analyze
4 the data and a lot of times people don't analyze, they
5 just look at air quality emissions data, and they don't
6 realize the importance of the model and I think we need
7 to emphasize to EPA that we need to model this data,
8 because if they fund the infrastructure that these data
9 bases are run on continuously, year to year, and EPA
10 controls the data bases that don't support specific
11 goals, don't support health studies, don't support
12 aspects in other parts of the domain, you don't have
13 any chance.

14 **SPEAKER:** Are we saying that we
15 desire to have long term monitoring, and that we're now
16 serving two purposes. One is to validate the model.
17 That's going to take us on the order of three years for
18 data? The other purpose is to help us through the
19 source receptor models to evaluate, in an
20 accountability sense, the effect of emissions
21 reductions.

22 **MR. CASS:** Yes.

23 **SPEAKER:** That will help us to
24 validate the polarity models. If your polarity models
25 predict that certain things are going to happen and
26 there's no better test of how they're doing than seeing
27 if things happen when...

1 **MR. CASS:** Even the basic program
2 that's proposed here contains a lot of high time
3 resolution data. A lot more than we have now.

4 **SPEAKER:** I'd like to just ask this
5 question. What about, then, get as a result of very
6 different emissions reduction strategies in different
7 regions of the country, then you might want to move
8 your site for just that reason to evaluate the impact of
9 those emission reductions.

10 **MR. CASS:** Without any baseline
11 data?

12 **SPEAKER:** Well, yes, I mean you
13 start to create a baseline. I mean, otherwise, Glen, I
14 think what we're saying is once we put these things
15 down, they're there perpetually for that very reason
16 because anyplace else you go won't have that baseline.

17 **MR. CASS:** I don't know how to deal
18 with the fact of the matter that...my sense of the
19 situation is that we began what we've begun with the
20 money to do what we've talked about. There's a handful
21 of those issues, and I am concerned about moving
22 monitoring sites around a lot because of data from,
23 what that will do is, it will turn this thing from being a
24 long term commitment to observing the atmosphere to a
25 series of special studies that will disappear into the file
26 drawer somewhere.

27 **SPEAKER:** One possibility would

1 be to have one supersite that's committed to two cities.
2 We could go to one for two years to get it running right,
3 then annually switch back and forth between two, I
4 mean, two year periods.

5 **MR. CASS:** If you've ever tried to
6 run some of this equipment, if you try to tear it down
7 and put it back up. I just had to have one of my
8 graduate students rent a car and drive the car from
9 Denver to Los Angeles in order to bring a fragile piece
10 of instrumentation back to L.A. without knocking all the
11 lasers out of alignment because if we put it in a
12 commercial shipping channel, it would virtually be
13 demolished by the time we got to the end. A lot of this
14 stuff is not all that portable. It is transportable, we can
15 set it up, we can get it running, but tearing it down and
16 moving it around a lot, you're going to constantly be
17 having this broken stuff, is my guess. You'll have lots
18 of holes in the data base when you're trying to make
19 some strides.

20 **SPEAKER:** One follow up on this
21 long term issue. I could see, at some point, looking at
22 the data, holding the data for future reference. That
23 would be a way of making cost savings, stop throwing
24 money into something we don't need. The second one
25 is, if the instrumentation has some kind of long span,
26 say the instrument only runs for two or three years and
27 then you need to replace it anyway, that might be your

1 hate to keep going back to this. Let's say we take a
2 rural location and we all end up under bounded
3 emissions. Would you be satisfied with that?

4 **SPEAKER:** Well, sure thing. Then
5 in that case...

6 **SPEAKER:** Other than that, is there
7 any reason why we couldn't move one or two
8 supersites. Because it's expensive, it's complicated
9 because of the sophisticated instrumentation.

10 **MR. CASS:** It means tearing down
11 all the significant structure of people and their lives
12 who support this. We're not talking about coming in for
13 a week or two and leaving. We're talking about stations
14 that are running for years at a time and people who
15 have moved to those locations to operate them.

16 **SPEAKER:** Look at Army bases.
17 Army bases are a good example, and I think what you do
18 is you keep your seven sites, including the one that's in
19 the rural area, and move the population around. That's
20 your job. That way you know the demographics.

21 **SPEAKER:** You should move in all
22 the elderly susceptible populations.

23 **SPEAKER:** I want to throw out a
24 conceptual something to think about. I mean, when you
25 look at this, you guys, apportioned for seven sites and
26 it seems like the rationale is good. We talked through
27 a lot of issues. Now, is there a way that you could turn

1 some of this around to deal more specifically with the
2 issue of regional haze? Is there a way that this group
3 would recommend that supersites for the purposes of
4 regional haze at those receptor locations could be
5 identified, and that cities or urban complexes could
6 serve as important satellite areas, that sort of thing?

7 **MR. CASS:** Yeah, first, I think there
8 are two parts to this question and first let's address the
9 question of, you said initially, well, you guys have done
10 a decent job of distributing sites around. We're at the
11 level now where we should be talking about are these
12 reasonable locations for the purposes of the overall
13 objective? Pradeep and I just did this off the top of our
14 heads. I mean, there is no reason why there is anything
15 special about these site selections. We just started
16 with the premise that we weren't going to get more than
17 about eight or so of these sites. Now, you know, would
18 you want to put one or more of them someplace else for
19 really important reasons? In terms of, we're also
20 suggesting siting them sort of generically. We don't
21 mean when we say New York. We don't mean when we
22 say Chicago, that it's necessary downtown Chicago.
23 What we mean is it's somewhere around this end of the
24 Great Lakes and the other one is like, the Cincinnati
25 site that we had, that was just a guess of a city in the
26 Ohio River Valley. The general notion is to put a
27 monitoring site in what we believe to be a hot spot in

1 the Ohio River Valley. It could be in Louisville, it could
2 be in Cincinnati, it could be wherever somebody thinks
3 there's a good reason to put it there.

4 **SPEAKER:** I have a suggestion.

5 Mention has been made of a boundary site, of a rural
6 site. I would suggest possibly the ARM site.

7 **MR. CASS:** Where is that located?

8 **SPEAKER:** In Oklahoma, isn't it?.

9 **SPEAKER:** In Tulsa.

10 **SPEAKER:** I guess the question is,
11 do we divide the sites, rather than in which cities or
12 which locations, how would you classify the sites?
13 Would we want to see three urban sites, three suburban
14 sites, three regional representative sites or how would
15 we divide that or would we want to see seven urban
16 sites?

17 **MR. CASS:** The other addition to
18 that question really is to what extent do satellite sites
19 serve the purposes in locations where the supersites
20 are not located? Because part of this proposal is to put
21 out six or eight times as many satellite sites with
22 partial instrumentation. They could all be put along
23 boundaries if we needed to. The question is, you need
24 a supersite, there will be something on the boundaries.
25 It'll either be a supersite or it will be a satellite site.
26 Do you need a supersite for the boundary? If so, which
27 boundary. We've got four edges to this room, if we put

1 four of the five sites on the agreed boundary, we have
2 nothing left in the middle. So...

3 **SPEAKER:** I would suggest to you
4 that there's no way you're going to get one of the
5 supersites placed in other than a population area
6 where, sort of, health effects is the primary function.

7 **SPEAKER:** I think that the satellite
8 sites are sufficient for boundary, and I agree with Bill, I
9 think there is enough difference in looking at all the
10 areas you're picked here, enough causal probability
11 difference in the types of exposure. It's a hard sell to
12 say that it wasn't more important to get the
13 meteorological data and then the source receptor, and
14 what we've got spelled out for these satellite sites is
15 really very good.

16 **MR. CASS:** So, basically you
17 recommend using the satellite sites for boundary sites?
18 Okay.

19 **SPEAKER:** Yes.

20 **SPEAKER:** On the question of
21 justification, I would worry a little bit about putting in
22 this major new network and rationalizing that it's
23 supposed to be multi-purpose, multi-user, and not tying
24 it to the radiation community, which is why I suggested
25 ARM.

26 **SPEAKER:** Yeah, if you look at all
27 the sites you plan to put in there, 1,500, the big hole is

1 in the middle. So I think that's the place that we would
2 like to have some of these satellite sites to put in
3 there. Basically along the boundary of the eastern
4 United States modeling network. That's the place that
5 we have the big hole.

6 **SPEAKER:** There's no PAM sites
7 there?

8 **SPEAKER:** No. There's nothing.

9 **MR. CASS:** I would agree, and
10 looking at this map...

11 **SPEAKER:** I'm suggesting satellite,
12 not supersite.

13 **MR. CASS:** Okay, but I mean if I had
14 to put another site on this map, if somebody gave me
15 one more monitoring site, I'd probably stick it over here
16 somewhere.

17 **SPEAKER:** But that's why if we look
18 at prevailing wind directions and do a nested approach
19 to the siting of the satellites, I think we can cover the
20 region quite nicely.

21 **SPEAKER:** I guess that pushed my
22 question a little further. Would the source receptor
23 community be satisfied with seven or eight urban sites
24 only? Is that sufficient?

25 **MR. CASS:** Ted, given what you
26 know of the likely resources that we can put our hands
27 on, you know, would you be satisfied with seven

1 supersites and 40 satellite sites?

2 **SPEAKER:** Going back to the first
3 question of there being urban sites, actually I think
4 that's most appropriate in that the urban PM is going to
5 be built upon the regional PM, so you're still going to
6 get the regional signature as urban measurements, plus
7 you get the urban additions. So, I think it makes
8 complete sense to have those primarily in urban or
9 suburban down wind of the urban areas. My other, if
10 one has to be satisfied, if I look at sort of what you've
11 got there between having five supersites, then the
12 satellite sites, plus knowing what's going on with the
13 other PM sites throughout the east coast, that's going
14 to be a tremendous amount of data to really start
15 looking at evaluating models. I'm not really familiar
16 with the Atlanta region, but I think there's something on
17 the order of four speciation sites, five speciation sites,
18 and about 10 other mass sites going in?

19 **MR. CASS:** Yeah, but the little red
20 dots that I put there are just, you know, like
21 chickenpox. They're not a recommendation on where to
22 put satellite sites. They're just an indication that
23 there's something else out there.

24 **SPEAKER:** There's going to be,
25 you're going to get good speciation data and plus
26 having extra information from the supersites, there's a
27 tremendous amount of other data that's going to be out

1 there.

2 **MR. CASS:** What we're talking about
3 is cranking up the speciation sites and taking as high
4 as four hour resolution data during the episodes, and
5 that would probably be possible only in a limited
6 number of the nation's speciation sites. They'd be only
7 the ones that are part of EPA's trends network, for
8 example, where EPA has control over how they're
9 operated. Yeah?

10 **SPEAKER:** I'm not really sure, but it
11 seems like since your table sets out a long list of what
12 should be where in terms of instrumentation and you
13 can infer that the seven or eight sites would be fairly
14 consistently operated, either during the intensives or
15 during their annualized routine, I guess if I put my
16 regulatory hat on, I'd want to be darn sure that the six
17 or seven or eight sites that were picked, answered the
18 most interesting regulatory questions from that point of
19 view, because when you have multiple regulatory
20 standards to deal with, those are more important than a
21 single standard. It sounds like you covered some of
22 that already, but you can clearly, you can easily elicit
23 those from the agencies they're at.

24 **SPEAKER:** Well, I think one
25 important regulatory question, certainly one very
26 important source receptor question that needs to be
27 looked at, whether it's at a supersite or a satellite site

1 is going to be transponder data to measure PM increase
2 in Canada. I'm don't know for sure or not what's being
3 set up here is going to correspond very well to this
4 transponder issue. In Canada or even in Mexico. So I
5 don't see that being talked about for the supersite site
6 selection.

7 **MR. CASS:** Okay, there are two
8 ways to look at that question. One would be to
9 recommend that we move one supersite south of the
10 border, another one north of the border, thinning out
11 the network inside the blue outlined portion of that
12 diagram or, alternatively, inviting Canada and Mexico to
13 install their own.

14 **SPEAKER:** We have a supersite
15 that's gotten about 90 percent of what's in your table
16 here running now. It would be beneficial to us to have
17 something like a midwest site or Chicago moved to
18 Buffalo, for example, so it's nearby or to Detroit, which
19 also a part within that region.

20 **MR. CASS:** So you've already got a,
21 you've already got a site like this in Toronto and you
22 need to move another one closer?

23 **SPEAKER:** Yeah, because if we see
24 the same problem in Toronto, and you guys are seeing
25 this amount in Pittsburgh and Mexico City, if you have
26 your own site nearby on your side, you can say, yeah,
27 we see the same thing.

1 **MR. CASS:** Well, what if we have a
2 transporter reaction modeler that covers the
3 boundaries, as well as the interior, and is validated
4 against the Toronto supersite and transport it across
5 the boundaries and calculate it?

6 **SPEAKER:** Then you have, either
7 you will or you won't. But, again, I think we've got the
8 flexibility with the satellite sites to be able to put a site
9 in Buffalo or Detroit, you know, in northern Vermont to
10 look at how much Montreal is dumping on us. The
11 trajectories for Donelevsky's dogs going through
12 Montreal is the source of his heart failure.

13 **MR. CASS:** Well, I can tell you that
14 I live in Maine about half the year, and when the air
15 blows from Canada, it's very clean.

16 **SPEAKER:** But, I think the key
17 would be to incorporate their locations in the design of
18 the satellite sites so they'd be more sure that we'd have
19 a seamless network.

20 **MR. CASS:** How do people feel
21 about deliberately coordinating and incorporating one
22 single supersite in Toronto into the overall program? It
23 sounds logical to me.

24 **SPEAKER:** What do you have to do
25 to set that up?

26 **SPEAKER:** Oh, well, we could easily
27 set it up. Right now we don't have anything. We're

1 trying to approach this to set things up. It certainly
2 could be done.

3 **SPEAKER:** I'm trying to center on
4 issues of transport, transport issues. If we measure
5 urban centers, we'd get the regional component as well,
6 and I'm wondering without setting up these sites in
7 some sort of paired arrangement, how would you really
8 be able to pull out from it the regional component?

9 **MR. CASS:** I guess I don't even
10 understand how varying the sites answers that.

11 **SPEAKER:** By having one outside an
12 urban center, away from an urban influence.

13 **MR. CASS:** We have on the order
14 maybe 40 of these satellite sites and those things are
15 going to be able to be placed inside and outside of
16 areas like that.

17 **SPEAKER:** Measuring different
18 things at different frequencies?

19 **MR. CASS:** No, measuring the same
20 things at the same frequencies, but not with as much
21 size resolution as the supersites. We're talking about
22 cranking up the speciation modelers to go out at
23 consecutive time intervals and watch with high time
24 resolution air mass even across consecutive sites and
25 tell the difference between the rural area and an urban
26 area.

27 **SPEAKER:** You'd do it with

1 meteorological data rather than doing it with aerosol
2 information?

3 **MR. CASS:** The aerosol information
4 isn't going to tell you about transport directly anyway.
5 It's just another measurement you can use to check
6 whether or not the transport calculations are working
7 correctly.

8 **SPEAKER:** So these satellite sites
9 are so far above anything that's in the planned routine
10 network that's available. They're really I think so much
11 closer to the supersites than they are to the routine
12 speciation sites that everything can be viewed that way
13 and I guess one of the positives is there's a possibility
14 for helping fund those to, there's a possibility of
15 getting data that has a bit more flexibility in the, as far
16 as the numbers of sites where the sources go, so that
17 some of the sources in the routine network go to a
18 fewer number of I guess we'd prefer to call them your
19 satellite sites to improve your time resolution and the
20 analysis of particulate matter during the intensive times
21 daily for these networks.

22 **SPEAKER:** I'm sorry. I didn't
23 understand that.

24 **SPEAKER:** If that was for me, I
25 missed the question.

26 **SPEAKER:** I'm wondering if there's
27 a possibility of flexibility in the magic number of 1500

1 sites. I think that everybody in here who has anything
2 to do with source receptor analysis on modeling, would
3 want to see a somewhat smaller number of sites,
4 something much more like some of these satellite sites.

5 **SPEAKER:** We're only talking about
6 as many as 300 speciation sites. I mean, we've talked
7 about just the first 50. So I think we have that
8 capability with the next 250 that go after.

9 **MR. CASS:** The big question I think
10 is whether or not we have the money to up the sampling
11 frequency at 30 or 40 of these sites during intensive
12 monitoring periods and have somebody there to change
13 filters frequently and maybe even up the flow rates and
14 so forth at the same time?

15 **SPEAKER:** You might want to make a
16 recommendation on that.

17 **MR. CASS:** I mean, basically we'd
18 be using principally equipment that was there for the
19 purposes of the 24 hour average speciation monitoring
20 network that would be used more intensively and
21 requiring more labor and more money for chemical
22 analysis in order to analyze chemicals taken during this
23 intense process.

24 **SPEAKER:** Initially, in order to have
25 that capability we need to be able to employ, they need
26 to be able to be activated, be able to take multiple
27 samples situationally, and you got to weigh it by

1 telephone modem so you have to put...

2 **MR. CASS:** Look, I've done a lot of
3 studies the hard way or you put a person at the site
4 when you have an episode and just change the filters. I
5 mean, that's what we've done for years. We're not
6 highly automated. We just put people out as necessary
7 to do the job. Okay, look, in terms of the general
8 placement of these monitoring sites, what I hear people
9 saying is use the satellite sites to monitor the
10 boundaries of the modeling domains and to make rural
11 versus urban comparisons within the modeling domain
12 and to cover the areas that are not coverable by the
13 small number of supersites. Are there any issues
14 about, you know, for example, does anybody contend
15 that, let's say nominally, the Cincinnati site ought to be
16 in St. Louis, or should we even be talking about that
17 part of the detail at this point?

18 **SPEAKER:** One problem I see with
19 this is that basically west of the Mississippi or
20 California, that's a problem, and also I'm not even sure
21 how you're going to do this, but if these models are
22 used to help in any way in regulation, I don't think east
23 of the Mississippi is going to tell you much.

24 **MR. CASS:** In the first place, who is
25 familiar, Bill, are you familiar with the modeling grid for
26 the front range area. Is there an enlarged modeling
27 grid in that geographic area?

1 **SPEAKER:** Yes, there is. There's
2 the Denver quality model. There are been two studies.
3 There have been that and then there's a study going on
4 now by NCHC using modeling data, 440 regional air
5 quality.

6 **MR. CASS:** Is there any commitment
7 to continue working on that domain? No? Bill Malm is
8 shaking his head no and he lives right there, and I'm
9 not aware of any.

10 **SPEAKER:** For past studies, but for
11 right now, no.

12 **MR. CASS:** Tell me what the other
13 regulatory issues have been.

14 **SPEAKER:** There's no PM10, there's
15 no ozone.

16 **SPEAKER:** Let me bring up an issue
17 for the west that I don't think has been talked about yet
18 and I'm not even sure how important it is, but it's worth
19 bringing up, I suppose, in the context of these studies.
20 In the next X number of years, certainly less than 10,
21 probably more on the order of five years, fire,
22 prescribed fire is going to be increased by maybe a
23 factor of 10, maybe a factor of 50, maybe more, and if
24 we set up regulations... We, if EPA sets up, if the
25 nation sets up regulations that require things like
26 reductions in the next 10 years of a certain amount and
27 you don't speciate or differentiate between the smoke,

1 which is associated with prescribed fire, and urban
2 organics, you're going to force industry into making
3 huge improvements at the same time, when it's really
4 due to smoke, when it's due to an increase in
5 prescribed fire. That's not making a judgment for
6 whether we need prescribed fire or not, but I think the
7 important thing is here, number 1, there may be serious
8 health effects associated with that fire, number 1, and
9 number 2, the ability to apportion between fire and
10 urban organics, I think is going to be pretty important
11 in terms of setting goals for industry.

12 **MR. CASS:** There's a fair amount
13 that could be done to separate out wood smoke from
14 other things, through organic chemical analysis and
15 elemental analysis, exposure based, samples that could
16 be taken from the speciation monitoring network and
17 maybe we should recommend that a program sort of
18 geared off of the satellite sites or the speciation
19 monitors ought to be targeted at that particular
20 objective. Bill, do you see of any need for a supersite
21 as part of that kind of an evaluation?

22 **MR. MALM:** I think one thing, you
23 can't ignore the northwest. That's an EPA hole, but
24 there's a lot of active, some very good scientists up
25 there working in Vancouver and in the Washington area.
26 They do have grid based models, I know they're gearing
27 up the nuclear models right now. I don't know the

1 details of what went on up there, but I think that
2 probably that's an area that needs to be checked out.

3 **MR. CASS:** Why doesn't somebody
4 tell me what is going on up there because I honestly
5 don't know.

6 **SPEAKER:** Glen Cass has
7 implemented a 4 kilometer grid model for the western
8 Washington region, and that's being funded by a
9 consortium of people. In fact, the Weather Service is
10 using it because it's real time, for forecast purposes,
11 and Guy Lam and now Wes Berg are working on a
12 photochemical input for that, as well as emission based
13 inventories in the states of Washington and...

14 **MR. CASS:** Is this a particle
15 modeling program?

16 **SPEAKER:** Not as yet in terms of
17 the chemical components. The MET drivers are there
18 and the, quote, chemical aspects of it.

19 **SPEAKER:** They have a new
20 proposal. There's a northwest consortium that includes
21 a sub consortium of modelers and they have proposals
22 developed and plans to, that are very complementary to
23 what they're talking about and the advantage of the
24 northwest is that they don't have the nitrate that's in
25 California, they don't have the sulfate that's in the
26 east, so there's an opportunity to really concentrate on
27 the carbon aerosol there, and there are some very huge

1 health studies already funded and others being started
2 in that area. So I know that group is going to have, has
3 prepared a proposal for our northwest supersite and
4 maybe you should consider it in terms of, I mean, I
5 don't know if the San Joaquin Valley could be a
6 satellite to L.A.

7 **MR. CASS:** The problem is here that
8 the winds typically blow sort of this way, so that this
9 doesn't go there and this isn't really coming here.
10 They're both going out into the desert at different
11 distances up the coastline.

12 **SPEAKER:** In Vancouver, with the
13 famous National Research Council, we have grid based
14 models that cover all of that, whether it's exactly the
15 volume you're at, so we have those kinds of proposals,
16 as well as model measurement emission studies.

17 **SPEAKER:** The Canadian group
18 from Vancouver is part of this consortium in the west.

19 **SPEAKER:** What are the PM2.5
20 levels?

21 **SPEAKER:** Yeah, what do you have
22 in the way of a particle problem?

23 **SPEAKER:** The problem is more of
24 an annual average problem than a 24 hour problem, but
25 the growth rate in some of the urban areas are such
26 that they're just barely meeting the standard now,
27 based on their projections. So...

1 **SPEAKER:** So right at the
2 standard...

3 **SPEAKER:** That's without the
4 increase in prescribed burning being...

5 **SPEAKER:** That's a mass based
6 estimate of the proposal, I mean, from the point of view
7 of carbon or some of these other species that might be
8 of some relevance to health. There's certainly plenty of
9 that with respect to the total mass.

10 **SPEAKER:** But they've already
11 demonstrated mortality increases and morbidity
12 increases well below the standards, which is something
13 to keep in mind. All sites probably shouldn't be in
14 places where we're way over the standard.

15 **MR. CASS:** Anyway, there are
16 suggestions that we have a northwest supersite. Where
17 would you put it?

18 **SPEAKER:** I think the population
19 based, it might be Seattle, but it is up for discussion
20 within the larger community, but I think from a time
21 series perspective, that's one alternative. The other
22 process would be something that's down wind of all the
23 prescribed burning that's projected, but I don't, the
24 problem with that is you get high exposures to those
25 populations.

26 **MR. CASS:** I wouldn't think it would
27 be the Seattle, Tacoma area?

1 **SPEAKER:** No, it wouldn't, but I
2 don't have an answer for you at this point. We had
3 considered a fixed location in that region with some
4 supplemental ability to move around the smaller states
5 in the northwest on an episodic basis, especially where
6 there's this forced burning issue, but either one of
7 those really fits directly into the context of this sort of
8 nonlinear source receptor issue that we're dealing with
9 here. So I don't think we want to take up more time.

10 **SPEAKER:** You've focused so far,
11 Glen, on validating the models, like models 3. You
12 haven't had any discussion about other objectives
13 related to SIPS and EPA's piece on their vision had a
14 little bit more in that.

15 **MR. CASS:** Well, we're also talking
16 about evaluating and setting up the testing of the
17 receptor based models like the ones that Bill was
18 talking about, and I would envision that to occur
19 broadly over a very large number of monitoring sites. It
20 requires less emissions data and meteorological data to
21 pursue that kind of set of analyses, and that's the
22 advantage. I mean, it's almost a sure thing that that's
23 going to get done off of data like this.

24 **SPEAKER:** The other view, to give a
25 visual from my biased perspective, is that you put some
26 of the diesel stacks in the northwest rather than big
27 star and...

1 **SPEAKER:** That's a question. Will
2 the speciation sites be sufficient for evaluating the
3 source receptor models?

4 **MR. CASS:** It depends on which
5 models. If you're talking about, let's say you have a
6 model for annual average of particulate matter, where
7 you try to compute the annual mean. We've run models
8 like that and checked them out and supplied a series of
9 24 hour average measurements and found those data to
10 be relatively useful for that purpose. Further, the
11 receptor models that might be used over annual
12 averaging periods, you know, clearly could be run off of
13 the data taken at speciation sites. You may, however,
14 wish to commission some special analyses of the
15 speciation site filters. You might want to gather up the
16 filters that we use to collect organic carbon and
17 analyze them for organic chemical species in some
18 locations in order to run specialized source receptor
19 analyses in places where there won't be a grid model to
20 sort out problems or where you have a wood smoke
21 problem that's very wide sourced, where the emissions
22 don't apply and you really don't have any hope of
23 getting a transport reaction model to correct the
24 problem.

25 **SPEAKER:** Didn't you just
26 describe...

27 **MR. CASS:** Yeah, what I'm saying is

1 you might want to supplement the analysis of samples
2 being taken by the speciation monitoring network. Not
3 planning on doing some of these things at present, but
4 the materials to do it are there. You have to go ahead
5 and organize the analyses of the samples in a slightly
6 different way, which I think is a cost effective thing to
7 do.

8 **SPEAKER:** Is that answer yes or
9 no?

10 **MR. CASS:** The answer is yes you
11 can use speciation sites to support those sorts of
12 sophisticated analyses if you think ahead about it and
13 augment the chemical analysis a little bit. You have to
14 augment the speciation network to get it to come out.

15 **SPEAKER:** But, the hard work of
16 taking the samples...

17 **MR. CASS:** That's right, but like 80
18 percent of the cost, or 75 percent of the cost of getting
19 these samples in the first place is already sunk, so in
20 terms of, the observation's clearly worth the money.
21 It's the cheapest way to get more information. Bill?

22 **MR. MALM:** The other issue we
23 talked about a little bit, but I think it's worth at least
24 adding one more piece of information that I happen to
25 know about, in terms of the potential health effects of
26 transport to Mexico. Clearly, from the improvement in
27 this, we're decreasing our emissions to Mexico way

1 down. During the winter time, along the southern
2 Arizona border, you see transport from Mexico that puts
3 arsenic levels on the average for the whole winter time
4 period above what Vermont has proposed for its stacks.
5 So there's very high arsenic levels down there. That's
6 just one thing I happen to know about. So, I don't know
7 whether you need to have supersites or a supersite
8 down there somewhere, you know, that's located in a
9 key position to address transport to Mexico or more
10 speciation sites, or additional speciation sites, which
11 are focused toward making some key measurements that
12 you know of.

13 **MR. CASS:** For those of you who
14 have had any dealing with the Mexican government, do
15 they have any interest in complementing this program?

16 **SPEAKER:** Well, we've done a
17 proposed study of the problem, but it's basically a
18 study... That's to look at transboundary transport from
19 the Monterey area and south into the Big Bend, Texas
20 area and Texas in general and vice versa... eastern
21 Texas and Big Bend. But, working with them. The
22 question was working with them and how. Yeah, you
23 can work with them, but it's difficult.

24 **SPEAKER:** Glen, to come back to
25 the question of the sites.

26 **MR. CASS:** Yeah, well, okay. In
27 terms of the amount of money that we're going to get, is

1 there anything, seven or eight of these supersites is
2 probably what you're going to get funded, what I've
3 been told, but nobody has said anything about how
4 many of the satellite sites we can and should try to
5 afford. Do people have a general sense that there are
6 six times or eight times as many satellite sites would be
7 about the right number or not? The reason why we
8 picked the numbers six to eight is, that's about the ratio
9 of satellite sites to the central sites used in SCAQS,
10 and we should be doing some health effects studies.
11 That's just a factor of experience. When people
12 carefully think for years at a time about how to design
13 and detail one of these studies and they've got limited
14 number of bucks, they generally wind up picking
15 proportions of about that number.
16 (Everyone Talking.)

17 **SPEAKER:** 30 or 40. The amount of
18 stuff you guys are spending at similar sites.

19 **SPEAKER:** There's different issues,
20 too. It all depends upon the density of emitters. If you
21 have a high density of emitters, you need more satellite
22 sites than if you have a low density of emitters in terms
23 of the model you use. We have modelers here. Who
24 ran the big regional models... Anyway, if you have a
25 bunch of highly, if you have high, there is some ratio
26 and maybe somebody can help me with this. There's
27 some ratio, some magic number of ratio of satellite

1 sites to measure this. But out west you can get by with
2 less satellite sites because the emitters are a long way
3 away. If you go out east here, I can't believe that
4 you're going to be able to say much about the spatial
5 resolution of transmitter with all these sources and be
6 accurate.

7 **SPEAKER:** Yeah, on some things I
8 agree. And similar to that, in one of those 12 sites, you
9 have complex measurements. So for the entire region,
10 you're talking six to eight sites. So I would say if the
11 sites are fairly far away one from each other, you'd
12 need...

13 **MR. CASS:** 15 satellite sites. Now,
14 the other thing is there's two possibilities for satellite
15 sites. One possibility is intensively operated high time
16 resolution use of speciation modelers to get those data.
17 The other is a different kind of satellite station, which
18 is more like for routine operation a speciation monitor
19 that would every other day for a few weeks or some mix
20 of those two. Does anybody see a role for 24 hour
21 average speciation obtained off the routine speciation
22 monitoring network without augmentation?

23 **SPEAKER:** I think very definitely. I
24 think that the cost in the satellite sites you have here
25 is going to be prohibitive if you start to go up to six or
26 eight sites. If you start looking at long distances,
27 hundreds of miles between sources, area or regional

1 area and cities, you're going to have to blanket the
2 whole country, 200 miles from Austin, Texas to Dallas
3 and the trouble with this, you could get away with 24
4 hour measurements, find your regional transport, and
5 subtract that from what your city has added, and still
6 get the same sort of information you're looking for and
7 you're going to have finer time resolution between
8 Washington, D.C. and Baltimore.

9 **SPEAKER:** Primary or secondary
10 results. Secondary results give you one set of data;
11 spatial resolution is going to give you a time frame.

12 **MR. CASS:** Yeah, I guess what I'm
13 trying to get around to is that there are going to be 300
14 speciation monitors out there and they're running into
15 particles, and the issue is really how many of those do
16 you want to kick into high gear, doing intensive and how
17 many do you want to just let operate as they normally
18 would and deliver up the data that they normally would
19 deliver, and then you would then use as part of your
20 data base?

21 **SPEAKER:** But the other speciation
22 monitor has the other ratio that you want.

23 **MR. CASS:** The real issue is how
24 many of those do you want to kick into high gear over
25 four hour time tables to change all these filters
26 consecutively.

27 **SPEAKER:** Keep in mind that 250 of

1 those speciation samplers are going to be actually run
2 by the states, it's going to be their protocols and their
3 money, so they're going to be more difficult to bring
4 into play than the 50.

5 **SPEAKER:** Also moving. They're
6 not going to be sitting in one place.

7 **SPEAKER:** They're designed to go
8 for only for two years because otherwise people will
9 say, well, you know, they solved their problem, they
10 moved on. Two years is enough, they're totally
11 responsible for moving on. That's why, particularly,
12 they say, well, they put out two years.

13 **SPEAKER:** Well, after the two years,
14 there may be some questions for an existing model.
15 The model may not be right, but they certainly can ask
16 some of these questions.

17 **MR. CASS:** Ted, if you had a choice
18 of 40 satellite sites with four hour time resolution or
19 160 or something with 24 hour average resolution, but
20 more spatial coverage, which would you prefer?

21 **SPEAKER:** I'd pick the 40 because
22 it's going to tell us a lot more about what's going on
23 and we can log it, and give us a lot more confidence
24 and you can plot and extrapolate to other areas.

25 **MR. CASS:** Suppose you had 40
26 sites with high time resolution and, you know, there's
27 another couple hundred sites in delivering up 24 hour

1 average data under normal operating conditions. Would
2 you gather up those data and find an appropriate human
3 data base?

4 **SPEAKER:** The other couple of
5 hundred?

6 **MR. CASS:** Yeah.

7 **SPEAKER:** Oh, yeah. That would be
8 no problem with the data base management tools.

9 **MR. CASS:** There seems to be some
10 concern that there may be state to state variability with
11 how those data are collected and you might find the
12 archiving process a little bit difficult.

13 **SPEAKER:** I think the protocols
14 are...

15 **MR. CASS:** Does anybody know if
16 the routine 300 speciation modelers are going to be
17 reporting to the area's data base. In other words, will
18 there be some uniformity in format with this data?

19 **SPEAKER:** Well, that's not exactly
20 true. The 50 trend sites will all be in the ERA's data.
21 It's not clear, I don't think it's clear that the 250 that
22 the states can use where they want, that that data will
23 all go into the ERA's data base. They could be very
24 short term calculated studies to identify a particular
25 source for our SIP development, but recommendations
26 could be made to do it.

27 **SPEAKER:** Could I make a

1 suggestion about how far the ratios should range?
2 What if it was targeted to what the model's needs were,
3 versus some modeling exercises might be multi-
4 parameter and have a need for more spatial and/or
5 temporal resolution. Others would be more targeted. I
6 mean, just on the simple basis, I think the Washington
7 people have raised this question about there probably
8 should be more of these boxes in the west, just because
9 of topography and source configuration and that sort of
10 thing. Couldn't we just let that ratio emerge, suggest
11 some minimum and use Bill's 40 as the maximum or
12 something?

13 **MR. CASS:** I think the problem we're
14 going to run into is that unless we have reasonably
15 good reasons for wanting to specify a certain number of
16 these satellite sites, that we'll get a random selection.
17 At present there really is some rationale behind the six
18 or eight times, four hour average filter sample, running
19 the satellites for the intensive monitoring stations. If
20 you instead tell people, well, we'll take anywhere from
21 five to 50 over either four hour or for 24 hour averaging
22 times, the chances are you're going to get as little as
23 one in the long run. Your request won't be specific
24 enough.

25 **SPEAKER:** Well, I guess I assume
26 that these intensive studies, for example, would be
27 bracketed by a study plan specifying the objectives in

1 terms of what's going to be accomplished and that
2 would be one of the things you would do.

3 **MR. CASS:** Look, the problem I see,
4 I do a lot of model evaluation work. More sites is
5 always better. The problem is the pocketbook is not
6 infinitely deep, and I think it's going to be a miracle if
7 we got seven or eight supersites and 40 filter based
8 intensive monitoring sites all coordinated with each
9 other. That leaves open the question of where to put
10 that, including the northwest, but I can't conceive, does
11 anybody conceive of having more money than that?

12 **SPEAKER:** No.

13 **MR. CASS:** No.

14 **SPEAKER:** In terms of our rule of
15 thumb here, the six to eight, how about location? I
16 think we sort of came up with location, this notion of
17 the urban center and up wind, down wind, background
18 site. Is that, and I kind of note the little island terrain
19 around Denver. In terms of the six to eight winners,
20 and I know that's just a prelim..., but it raises the
21 question, up wind, down wind?

22 **MR. CASS:** There should be some
23 distribution of background sites, background satellites
24 designed to monitor the boundaries of the modeling
25 region and to understand what the air looks like before
26 it crosses into the area where the smokestacks are
27 located. There should be information on the up wind of

1 the city and down wind contribution from the targeted
2 areas, so we can see what the gradient looks like to go
3 across a measured area, and then we should be
4 spreading these out to cover a more reasonable
5 selection of population centers.

6 **SPEAKER:** I think those are design
7 criteria. You were saying we need to have a rationale
8 as to why. I think that helps.

9 **MR. CASS:** Can we move at this
10 time? We have a half an hour left, to the list of
11 important outcomes that we need to put together. There
12 are a group of people who recommend certain
13 instruments from sites or tell us that there are certain
14 measurements are just a lot more valuable than others.

15 **SPEAKER:** I'm sorry, now we're
16 leaving the discussion sites. If I didn't ask the
17 question, if we needed, if we had a shortage of funds to
18 be able to cover all these sites that we've been talking
19 about, and we needed to put a site up in the Pacific
20 Northwest and we needed to find a sacrificial lamb,
21 what is the possibility of, for instance, having one of
22 the California sites be the one up for evaluating, and
23 the one model would move then to the other location.

24 **MR. CASS:** I don't have a problem
25 with picking up one of the two California sites and
26 moving it to Washington, if that's what people want to
27 do.

1 **SPEAKER:** I know you wouldn't want
2 to evaluate...

3 **MR. CASS:** Yeah, I have no problem
4 with adding another intense monitoring site or supersite
5 in Seattle. You know, if people would simply make a
6 clear recommendation that the group may either
7 endorse or not endorse about moving or adding to the
8 system, I'm up for it. I've got nothing against putting
9 any of these sites in another location. Does anybody
10 have a feeling about that that they want the group to
11 endorse?

12 **SPEAKER:** I think one of the
13 problems is, what happens to the health effects people
14 as a result?

15 **MR. CASS:** Does CARB have
16 sufficient resources to do such a study? It may well be
17 the case that the San Joaquin Valley study would meet
18 the needs of the San Joaquin site.

19 **SPEAKER:** I think that's an
20 important point. Within some boundaries, we should
21 limit ourselves to seven with the idea that there's more,
22 and maybe let somebody else sort out the rest.

23 **SPEAKER:** I think there is much to
24 recommend putting a site in Seattle because of the fact
25 that it's going to be wood smoke.

26 **MR. CASS:** Would you recommend
27 removing one of the other sites and placing it in Seattle

1 or adding a site?

2 **SPEAKER:** Yeah, well, particularly
3 if the San Joaquin study is likely to cover that model
4 need, then wouldn't it make more sense to move that
5 one up to Seattle?

6 **MR. CASS:** Right now I don't know
7 that the San Joaquin Valley study would necessarily do
8 that. They have...

9 **SPEAKER:** The question, then, is
10 whether you can sit there long enough to solve their
11 problem.

12 **SPEAKER:** We're also saying that
13 we would recommend that if you have nine sites and
14 then we're saying if you can't get nine sites, maybe
15 they will instead give us this.

16 **MR. CASS:** Let's just add. Let's
17 just recommend that we add Seattle to this list and then
18 see what the reaction is. I get the sense that if we
19 have to cut back from that, that we would look for the
20 existence of another regional study, financed
21 independently to meet the same need because the
22 needs are probably there. You've got those sites in
23 places where the air quality is really bad.

24 **SPEAKER:** It could be that instead
25 of one of the nine sites, you take in so many other sites
26 in the space of 50 sites, 200 sites, some of those funds
27 would be applied to a more pressing need, should we

1 have 300 needs, when we really should be choosing one
2 of these.

3 **MR. CASS:** You're saying three
4 things. One, we see reasons from our own point of
5 view. Source receptor placed in Seattle or the
6 northwest. Two, we see the need for all these that
7 we've identified plus that. Anything else, not within our
8 resources, so we're going to hope that maybe the other
9 sponsors and other studies going forward take the
10 responsibility for one of these sites. Three, I hear you
11 saying, and we are somewhat flexible in some of our
12 sites, depending on what we hear from the other
13 groups.

14 **SPEAKER:** Yeah, for example, the
15 health effects people may be down there right now
16 recommending a big health study in the Utah Valley
17 because of its metals or its aerosol, let's say. I
18 wouldn't personally have a problem with moving this
19 thing from Denver over the mountain, over there, to do
20 that research for health effects. Right now it's a
21 Denver site, but it could be a Utah Valley site.
22 Anybody who lives in that part of the world has got a
23 firm opinion about whether or not that site ought to be
24 on one side or the other. Bill, you know, is free to
25 speak up.

26 **MR. MALM:** Yeah, I think that
27 probably the Utah Valley site and the Denver site share

1 a lot of similar problems. I think they're similar in
2 many regards. They're rapidly growing and the air
3 quality problems are likely to be increased. For both of
4 them, the severe air quality problems are more likely to
5 be during the winter time than they are during the
6 summer time, the traditional brown cloud in the Denver
7 metropolitan area. With regard to the Denver area, I
8 guess the emerging air quality problem that people look
9 at is the rapid increase in commercial animal farming
10 that's occurring in Colorado, because there's no
11 regulation and as a consequence, during the winter
12 time, the ammonium nitrate problem is getting very,
13 very severe very rapidly. During the summer time, too,
14 there's more incidences now in that area of increased
15 ozone levels. I suspect that has to do with the
16 increased population over the area. So that's kind of a
17 thought sketch of the air quality problems in the Denver
18 area.

19 **MR. CASS:** Would people in general
20 agree that it's hard at this point to distinguish between
21 the need for a site in Denver as opposed to the Utah
22 Valley?

23 **SPEAKER:** I would disagree with
24 that. I think Utah is a compelling location. Its
25 concentrations are among the highest 24 average PM2.5
26 in the United States, over 120 mcg per cubic meter in
27 the winter time.

1 **SPEAKER:** From a health
2 perspective, they have more children per capita than
3 any other state and, I just heard this on the radio this
4 morning, in fact, and that's considered a sensitive
5 population for health effects. A lot of kids there.

6 **SPEAKER:** Largest average Indian
7 population in the United States.
8 (Everyone Talking.)

9 **SPEAKER:** For modeling purposes,
10 I'd like to see a certain level, and the reason that I
11 think that, in terms of laying out the eastern portion, I
12 think that gives you a bit more information on what's
13 moving from west to east and a lot of the Chicago urban
14 suburban impact end up over the lake and we don't
15 know which side they're going to hit, so you're not
16 going to sort of pick them up anyway. So, for that
17 reason, I'd recommend moving that St. Louis area.

18 **MR. CASS:** We're going to have to
19 shorten up this part of the discussion if we want to get
20 to the crux of this, guys. It's got to be important
21 enough that you don't want to talk...

22 **SPEAKER:** One thing on the
23 funding, we should make the ideal hit areas an
24 emphasis for funding. Another possibility, another
25 tactic to level at the EPA people is if there are
26 competing areas, we're going to fund one phase, if you
27 want us to fund the entire phase, just say, well, we've

1 got two competing areas we're having trouble deciding
2 against, so each of you come up with half of it.

3 **SPEAKER:** At some point in the
4 development, it's also the case that we may run short of
5 manpower needed to run these sites. There is a limited
6 resource there as well. It's going to be really tough to
7 do even seven sites well, anyway.

8 **SPEAKER:** Since I would never
9 request to move Toronto and Chicago, but I'd like if you
10 could put into discussion some recognition that you
11 need to have the Canadian partner involved in this work
12 to cover all the site. We've heard discussions about
13 what's good for health in supersite type studies, but
14 also the need for having this Canadian supersite as
15 partner because of the transponder issue and that
16 would help Canada with us trying to get the funds.

17 **MR. CASS:** I don't think there would
18 be any attraction whatsoever to try to put a dot on the
19 map up there to dedicate to Toronto, make a formal
20 recommendation that that be part of the overall
21 program. For that matter, if you want more than
22 Toronto on the other side of the border, that'd be fine,
23 too. We would have no problem recommending three
24 sites.

25 **SPEAKER:** I mean, it goes beyond
26 the recognition to say that it's important that we have a
27 site somewhere there in Canada or place a transponder

1 on site, and then give us more of an unusual...

2 **MR. CASS:** Would you like two
3 sites?

4 **SPEAKER:** How many can you
5 provide?

6 **MR. CASS:** No, no, no. That's not
7 the point. The point is we could help you get the money
8 from the Canadian government. Okay, we need to move
9 on.

10 **SPEAKER:** That's all I wanted to
11 say.

12 **SPEAKER:** It's a different
13 situation. U.S. data is not always, our data is not their
14 data. You have the U.S. supersite, but we need a
15 Canadian supersite that's part of this program so it's
16 recognized and that would probably alleviate that
17 problem.

18 **MR. CASS:** Now, let's take a look on
19 Table I, Page 20 at the measurements that are being
20 proposed. Yeah?

21 **SPEAKER:** Yeah, I wanted to
22 mention...

23 **MR. CASS:** Could you speak up
24 because most of the people sitting behind you can't
25 hear what you're going to say.

26 **SPEAKER:** On the first topic you
27 have on gases, I think it's good to take the UH NOC

1 measurements, but you only have them for the air part.
2 I think the ground as well, if possible, there should be
3 studies. Fortunately, they're not that difficult because
4 the other ones are going to be for nitric acid and
5 sulfuric acid. You want to know if the models produce
6 those well enough.

7 **MR. CASS:** Do we have enough, do
8 we have the capability to make those measurements at a
9 large number of sites? The personnel resources that
10 currently exist?

11 **SPEAKER:** They could not exist.
12 Which number...I don't think that, but maybe someone
13 could comment...

14 **SPEAKER:** Could you speak up a
15 little bit? We can't hear back here.

16 **MR. CASS:** Why don't you stand up
17 and face that direction. What's happening is the words
18 are being broadcast only one way.

19 **SPEAKER:** Yeah. I think it's very
20 clear, we've outlined extension, that escaping
21 adsorption, but we really won't be able to really see it
22 as much. Under surface meteorology, it can be called
23 for under existing models, and a lot of those PM results
24 would be in hot, smoky, cloudy locations. Also cloud
25 and fog in spatial and temporal distributions in some
26 cases. Under surface deposition, you'll have some very
27 basic gradations. I think you can specify wet, dry,

1 which chemicals can be measured and in a prime
2 position, something was done similar to the epi study in
3 1990, measuring trace elements. Finally, I would add
4 one configuration of gradations. I mean, emission data
5 are critical, but also in depth measurements can be
6 used to good effect in the observation models, to
7 measurements downwind of large ambient sources is
8 another example. So that's what I have.

9 **MR. CASS:** Other people have
10 looked over these numbers and have direct comments?

11 **SPEAKER:** I don't understand why
12 it's not light scattering and particle count at the
13 satellite continuous. It seems to me that's prime model
14 testing information, very high information content,
15 relatively low cost to run.

16 **MR. CASS:** You say number counts,
17 you're talking about CNCs?

18 **SPEAKER:** Yeah.

19 **MR. CASS:** Okay, you're putting
20 CNCs in satellites?

21 **SPEAKER:** CNC, yeah.

22 **SPEAKER:** Would you extend that to
23 absorption too, then?

24 **SPEAKER:** Yeah, yeah, yeah.
25 Especially since one of the hypotheses is the soot.
26 One of the health hypotheses.

27 **SPEAKER:** You said only in the

1 supersites, not in the satellites?

2 **MR. CASS:** No, no. He's talking
3 about adding...

4 **SPEAKER:** At present they are only
5 in the supersites. They are not in the satellite sites
6 even for intensives and I think they ought to be in the
7 satellite sites.

8 **MR. CASS:** What's the cost going to
9 be like? Really the reason why they were left out was
10 just a judgment on our part that the money to do that
11 wasn't there, but, you know, maybe it can be made to be
12 there. Certainly we want to ask about this.

13 **SPEAKER:** I have a hard time
14 believing it's more expensive than four hour speciated
15 measurements.

16 **SPEAKER:** Yes, one comment on the
17 ophtholometer. If you're going to recommend an
18 ophtholometer, I would, I would not suggest that that is a
19 good thing to do or not, but if you're going to
20 recommend a ophtholometer, you need to specify
21 something about the inlet, that you're trying to measure
22 ambient 2.5 micron inlets and you'll need to specify
23 something about either know exactly what the
24 mechanism is inside that gadget for controlling the
25 area.

26 **SPEAKER:** We're adding a lot of
27 these. Have we forgotten that we have a huge

1 supplement to the improved network that's already
2 going in, 100 additional sites on the regulatory
3 network?

4 **SPEAKER:** What is your set-up?

5 **SPEAKER:** Aerosol samplers.

6 **SPEAKER:** Not even the surface
7 MET.

8 **MR. CASS:** Other comments on
9 equipment and measurements?

10 **SPEAKER:** I support Christian's
11 comment about the source measurements. It wasn't
12 clear to me from the presentation as to what thought
13 you had put into or consideration at all of source
14 profile type analyses.

15 **MR. CASS:** Basically, what we were
16 asked to do here was to try to figure out how in the
17 speciation network, source speciation monitoring, the
18 atmospheric supersite monitoring program could be
19 used to the benefit of source apportionment work, and
20 certainly, I think we need to make at least the
21 recommendation that you shouldn't do this at all if
22 you're not prepared to provide, through other means at
23 least, the initial inputs and the money to do the data
24 analysis. If they don't plan to fund the data analysis,
25 then we shouldn't have it. If they don't plan that the
26 emission data are going to be taken to support the
27 modeling effort, then this shouldn't be done either, from

1 the point of view of source receptor or source
2 apportionment work.

3 **SPEAKER:** I think that's a good
4 point for tomorrow morning.

5 **MR. CASS:** Yeah, but, whether or
6 not, we weren't asked to design an emissions inventory
7 program, although we certainly could.

8 **SPEAKER:** There's nothing here on
9 single particles, either through microscopy or...

10 **MR. CASS:** Actually there is,
11 although it may not be identified as such.

12 **SPEAKER:** Okay, but you may also
13 want to supplement some things with microscopy as
14 well. I mean, once you have the collected samples, you
15 can use morphology, for example. So there may be
16 some...

17 **MR. CASS:** We certainly need to
18 clarify the fact that the single particle instruments were
19 intended to be, assumed to be one of the ways in which
20 the continuous particle monitoring mandate was being
21 satisfied at the sites.

22 **SPEAKER:** Supplementary analysis,
23 you know. There's certainly, I'm not suggesting
24 microscopy on a routine basis. There may well be site
25 samples for which or during which that may help.

26 **SPEAKER:** I, as a reality check, I
27 would comment that the, even the PAMS network, which

1 is directed specifically at NOX and ozone doesn't have
2 widespread functioning in a wide system of
3 measurements, so a lot of these are really pushing it.

4 **MR. CASS:** As a reality check, there
5 is a monitoring site that looks a lot like much, but not
6 all of this operating in Germany for the purposes of the
7 health effects study and the only reason why it stays up
8 and running at all is because you have a Ph.D. operator
9 at the site, who literally sleeps with the equipment.
10 You know, this is the kind of dedication it's going to
11 take to make this bundle of equipment work. I can
12 remember how many graduate students we burned out
13 over the years by trying to run six continuous monitors
14 simultaneously and keep them all going at the same
15 time. This is not an easy thing to do.

16 **SPEAKER:** I would return to my
17 earlier suggestion and add Germany to the list of
18 places we should...

19 **MR. CASS:** Yeah, any of you with
20 German heritage probably have right of return in
21 German citizenship, so this is an entirely feasible
22 suggestion.

23 **SPEAKER:** Glen, we have a site
24 operating that I could elaborate on.

25 **MR. CASS:** Yeah, why don't you tell
26 the people what the experience has been with the
27 ability to staff that site and keep the equipment all

1 running at the same time?

2 **SPEAKER:** The site is a week old.

3 **MR. CASS:** So, nobody has burned
4 out yet?

5 **SPEAKER:** That is correct. No, I
6 think they were already burned out. The people who
7 built the site are burned out.

8 **SPEAKER:** How much did it cost to
9 run that site for the two or three years that we're
10 talking?

11 **SPEAKER:** We're talking about cost
12 estimate of I think, I would say something around 3
13 million dollars.

14 **MR. CASS:** Per year?

15 **SPEAKER:** One site for 18 months.

16 **MR. CASS:** 18 months?

17 **SPEAKER:** 18 months.

18 **SPEAKER:** That's build and
19 operate.

20 **SPEAKER:** Glen, I think there are
21 several groups, either for short term, relatively short
22 term studies or long term networks that if we operate
23 one that does most of the filter based measurements
24 you have here on a routine basis, would it be helpful to
25 recommend that people provide cost information so that
26 we can do a better planning job for how much satellites
27 and the supersites cost?

1 **MR. CASS:** Yeah, I think that
2 anybody who has in practice experience with cost of
3 purchase and operation of some of the unusual types of
4 equipment here, in a continuous monitoring mode, you
5 know, might help by sending in their cost information. I
6 know how much it costs to run consecutive filter based
7 samples for chemical species coordination and I have a
8 sense of how much it costs to buy differential analyzers
9 and optical particle counters and, you know, the fact
10 that it's going to take highly qualified people around
11 the clock to babysit this equipment, in all likelihood,
12 because we wouldn't want the data base not to be well
13 staffed. Yeah?

14 **SPEAKER:** There are other things on
15 the list there. Are you saying they're not in the
16 budget?

17 **MR. CASS:** Not when they're talking
18 several million dollars per site for a three month
19 period.

20 **SPEAKER:** I think we need to, not
21 right now, but I think one needs to specify, or maybe
22 you should specify, specify how the speciation works
23 under which situation.

24 **MR. CASS:** Well, for those of you
25 that do VOC analysis, you know the cost of getting 30
26 VOCs or 120 VOCs really depends on calibration. The
27 peaks all come off and it recognizes what they are and,

1 you know, so the cost of extraction of the sample for
2 30K species or 100K species for organics analysis is
3 the same, the cost of breeding the sample is the same,
4 the cost of just about everything is the same. It's just a
5 question of what your source is going to be like. The
6 cost is not prohibitive.

7 **SPEAKER:** Also, I was going to
8 suggest that.

9 **MR. CASS:** We recently did a tracer
10 analysis, organic tracer analysis for the San Joaquin
11 Valley study and the cost of sample collection,
12 including the atmospheric monitor and laboratory
13 analysis, data reduction, paper writing and modeling,
14 the whole bit, was \$45,000 bucks and that was about,
15 you know, six or eight episodes, six or eight station
16 episodes of analysis. So, it's possible to get cost from
17 that. Okay, any other comments on the equipment?
18 Basically, what's being talked about here is the
19 supersites are the central observatories that are, you
20 know, running gas monitors continuously, running
21 certain continuous kinds of particle monitors day in and
22 day out. Those are like aerial style ammonium and
23 nitrate monitoring devices, sort of modify hot spots.
24 Then you get a carbon equivalent. Then, fine particle
25 speciation from things like the speciation monitors
26 being collected over 24 hour average periods day in
27 and day out at those satellite sites with both the filter

1 sampling and other sampling components kicking into
2 four hour time resolution during periods that we're then
3 applying some intensive studies being used for model
4 evaluation purposes. Then, again on the first page, the
5 particle optical properties running continuously day in
6 and day out basically at the central observatories and
7 Warren's recommendation that we add that to the
8 satellite sites. The satellite sites are basically taking
9 some continuous particle monitoring data and some
10 enhanced filter based sampling data over the indicated
11 intensive and prolonged periods. Then, on the next
12 page there is a set of surface meteorological
13 measurements, temperature, relative humidity, wind
14 speed, wind direction, and recommendation for
15 specialized cloud and fog water measurements, which
16 we received some recommendations just now. Add
17 satellite observations in fog locations. Then, more
18 detailed meteorological observations at the central
19 observatory sites, where we try to get, put in
20 essentially sounders, confounders and the like, to give
21 us wind speed, direction, temperatures and elevation,
22 mixing up locations and so forth on a continuous basis
23 year round, and then to kick in measurements of that
24 sort at the satellite sites during intensive periods.
25 Yeah?

26 **SPEAKER:** Would the mixing depth
27 be derived from the temperature profile or would it be

1 from the particulate class?

2 **MR. CASS:** Well, I think we were
3 probably thinking at the time about the temperature
4 profiles. In other words, using profilers to tell us
5 where the dominant air is located. But, if we did what
6 you suggested, which is to add LIDER, then the particle
7 loading of the atmosphere would pretty much tell us
8 what the instrument was too. At least in the middle of
9 the afternoon.

10 **SPEAKER:** Yeah, the LIDER, those
11 kind of LIDER measurements are very valuable visually.

12 **MR. CASS:** I fly back and forth
13 across the U.S. about once a week and you can see the
14 value between the immediate layer and the layer above,
15 so clearly. Yeah?

16 **SPEAKER:** What about occasional
17 carbon isotope?

18 **MR. CASS:** Now, if you were
19 thinking of that as a means of narrowing wood smoke
20 down, there are more specific ways.

21 **SPEAKER:** Yeah, I understand that,
22 but I'm just thinking of it as a general set of
23 measurements.

24 **MR. CASS:** Yeah, I think that
25 certainly that is valuable information, but if your
26 analysis, if your modeling analysis shows that you have
27 a bad wood smoke problem, you know, the corroboration

1 or reputation of that fact is where that becomes useful.

2 **SPEAKER:** What about occasional
3 sampling of biologicals as tracers? As long range
4 tracers. That's a question, is that a reasonable...

5 **MR. CASS:** Some people tried to
6 develop that in the San Joaquin Valley study. They
7 were trying to distinguish between different kinds of
8 agricultural practices on the basis of biological
9 containments that might be contributing, so people are
10 trying to do it.

11 **SPEAKER:** It's still only been done
12 on bulk soils, not on aerosol samples.

13 **SPEAKER:** But I understand people
14 also do it on spores.

15 **MR. CASS:** Yeah, there's a lot of
16 data coming out on trying to find ways to do that. I'm
17 sorry. I can't hear you.

18 **SPEAKER:** They're culturing,
19 they're cleaning out and culturing the different
20 particulate maturations.

21 **MR. CASS:** Okay, have they been
22 able to convert that into a reliable way for doing source
23 apportionment work or is it something that's in progress
24 and they're trying to design new equipment?

25 **SPEAKER:** Progress.

26 **MR. CASS:** That's my assessment.
27 There were three or four or five different places around

1 the country that are trying to get biological means of
2 tracking aerosol sources. Okay, now, miraculously
3 we're at about 5:00, and does that mean we're supposed
4 to be done?

5 **SPEAKER:** Yeah, we are, but not to
6 forget these are dominated by coarse particles.

7 **MR. CASS:** All right. The general
8 sense that I have of the discussions is that if this could
9 be organized in the way that it's allowed to come to
10 pass, people would generally view this as an additional
11 type of program. You know, Ted, do you know of any
12 other way that anybody is going to get a model
13 evaluation data set?

14 **SPEAKER:** No. If you look at it,
15 there's actually a couple of the other programs on the
16 east coast, EPA samplers that are going to be
17 developing our study. Pradeep brought out, they're
18 running a fairly, they have something similar to one of
19 the intensive sites.

20 **MR. CASS:** One of the intensive
21 sites? Is that going to be...Suppose we do this.
22 Suppose we just let nature take its course. Are you
23 going to have the data you need to check out the
24 models?

25 **SPEAKER:** We're going to come,
26 actually, I think actually we'll be relatively close for
27 our area for the southeast. Then the northeast one is

1 also running some measurements, although I'm not sure
2 exactly what.

3 **MR. CASS:** Are you going to get
4 enough episodes to get your annual average down?

5 **SPEAKER:** Yeah, I mean, most of
6 these sites are running year round. Now, the one
7 question. My one concern is we might be missing some
8 specific processes that are important in areas outside
9 of the southeast or whatever.

10 **MR. CASS:** Could this or should this
11 kind of proposal be coordinated with your center and
12 the other center in such a way as to lay off the cost of
13 some supersites and satellite sites? In other words,
14 maybe this Atlanta site over here doesn't need it.
15 Maybe it gets moved up here to Washington and your
16 ongoing program provides that data.

17 **SPEAKER:** First, I'd never suggest
18 that.

19 **MR. CASS:** I'm trying to see if
20 there's actually a need for this in the first place.

21 **SPEAKER:** The thing that you could
22 do is augment what's already... I mean, Pradeep, when
23 making this stuff up, knew exactly what they're doing,
24 so there had to be some foresight.

25 **SPEAKER:** There's some things
26 there. I think the answer to your question is that there
27 are some things there, but in a sense it's... So I think

1 the answer would be, with some proper consideration,
2 maybe what EPA can do is to supplement what's already
3 happened.

4 **SPEAKER:** They don't say
5 supersites. They say....

6 **MR. CASS:** Basically, one
7 recommendation might be made, well, okay, let me
8 phrase the question more harshly then, Ted. Suppose
9 that this supersites program never came to pass and
10 that all you had was a center program down south. You
11 know, would you be able to do a good job? Somebody is
12 going to have to defend spending this kind of money as
13 something that is absolutely necessary because it's not
14 going to happen any other way. If, in fact, it is going to
15 happen some other way, then that's a real serious
16 problem. We'd better address it now instead of later.

17 **SPEAKER:** Well, Fred seems to be
18 wanting to say something.

19 **SPEAKER:** Yeah, I was going to
20 make a comment about this, and that is, perhaps in
21 terms of deciding where these supersites should go,
22 you should use a little bit of the parable of the coward,
23 that if there's not some sort of local effort that's
24 drawing it together, it might be very difficult just to use
25 money to locate a supersite at that particular location
26 and that any of these should draw off of local efforts
27 and local support in kind, to be able to say that it

1 deserves a supersite.

2 **MR. CASS:** One way to look at this
3 would be as an overall design for a large scale data
4 collection effort and then, in stage two, you take a look
5 at all of the local or preexisting resources and try to
6 check off things that already exist that you don't have
7 to pay for, to put out in place. Now, if it turns out, in
8 Ted's assessment, that, in fact, there are supersites,
9 you know, for various reasons scattered all over the
10 place and they're all ready, that we just didn't know
11 about, you know, you don't need anything more. Then
12 let's save a million dollars of the taxpayers' money and
13 not do this.

14 **SPEAKER:** Or spend it somewhere
15 else.

16 **MR. CASS:** Or spend it somewhere
17 else.

18 **SPEAKER:** Getting back to your
19 question, though, from the southeast, not the whole
20 east coast become awfully slow, and you find yourself
21 in danger of doing, of missing, after we get done and
22 finding out we cannot answer some specific process
23 questions.

24 **MR. CASS:** What you're saying is
25 that in the southeast, much of the objectives here might
26 be met by augmenting the existing program? Okay, now
27 what about in the northeast?

1 were probably aware of that.

2 **MR. CASS:** The advantage of trying
3 to incorporate and develop some of these preplanned or
4 pre-existing supersite like monitoring stations is, of
5 course, you get to save a lot of money. One of the
6 disadvantages is you may or may not have enough
7 control over the programs at those sites to ensure
8 anything approaching what you're funding.

9 **SPEAKER:** Another advantage is
10 that you have the personnel there. Which is limiting as
11 much as money.

12 **MR. CASS:** Anyway, it sounds like I
13 hear a recommendation that trying to work out the
14 details for somebody to make maximum use of existing
15 resources?

16 **SPEAKER:** EPA has a center in
17 Atlanta. I think that's the one we were talking about.
18 Now, there's also a question of southern companies.

19 **SPEAKER:** Actually, those are two
20 different. Those are two, two different things.

21 **SPEAKER:** Here, but in the Atlanta
22 area, they are not.

23 **SPEAKER:** Southern company has
24 really more of the supersites, whereas the sites have
25 one, they're not nearly so extensive.

26 **SPEAKER:** When you were talking
27 about Atlanta, you were talking about some sort of

1 combination of those two?

2 **SPEAKER:** Right. As Fred just
3 said, the EPA has more like satellite stations around
4 the southern...

5 **SPEAKER:** Okay, thank you.

6 **MR. CASS:** Are there any other
7 comments, overall reactions, you know, I think I have a
8 sense of what people have said. Do people feel that
9 this is something that should be pursued vigorously or
10 offered up as a best coordination with studies that are
11 otherwise justified from the point of view of health
12 assessments or what? Frank?

13 **SPEAKER:** What we are looking at
14 is, if there are other groups making contributions. You
15 made the point that they may have their own protocols.
16 Who have we got to recommend some sort of group
17 effort to establish conventional protocols?

18 **MR. CASS:** We certainly can
19 recommend it. Whether or not it's going to happen is
20 another question.

21 **SPEAKER:** But, if not, then try and
22 support some cross calibration so there is at least a
23 way to do some transfer.

24 **SPEAKER:** Maybe we could
25 recommend within our organization that there ought to
26 be some sort of standing body to carry out that
27 function.

1 **SPEAKER:** We're reinventing what
2 happened in meteorology...

3 **MR. CASS:** Any other final
4 comments? Anybody think that we have money left over
5 to spend that we haven't spent? Don't want to leave an
6 opportunity on the table. Yeah?

7 **SPEAKER:** You were asking about
8 pursuing this vigorously. My own personal opinion is
9 that I would argue that this is, I wouldn't argue for
10 spending all this money on this just for model
11 validation. I think that what we're doing, what I would
12 argue is that if people are going to spend money on
13 supersites for a variety of other reasons, including
14 health and so we have an interest in trying to make that
15 as useful a model validation as possible, but I don't
16 think it is justifiable solely as a model.

17 **MR. CASS:** I'm putting up a
18 proposal here in response to a directive that Pradeep
19 and I were given to assume the existence of a national
20 program of interest in supersites, how could they best
21 be used for advancing the ability to do source
22 apportionment work. I'm not personally advocating that
23 we necessarily have to do this at all. I certainly have
24 enough work that I don't need to do this myself. So, the
25 real issue is, what attitude do we take toward this
26 opportunity? You know, is it something that everybody
27 is just dying to do or is it something that should be

1 done, given that the stations are going to be there for
2 other reasons anyway, you know, or what?

3 **SPEAKER:** That's a good point. In
4 thinking about that, how can we do this, that, or both.

5 **SPEAKER:** It seemed like the
6 stations were a fait accompli, so I would just yield this
7 point to try and make maximum value added to the
8 equation.

9 **MR. CASS:** First of all, the opinion
10 was if these data existed, they would help the model
11 evaluation and source apportionment work for the
12 northeast and the southeast and update it easily, and
13 possibly update the plan in California and maybe even
14 Seattle and Utah desert areas. So, you know, certainly
15 the SCAQS data base has been mined and mined and
16 mined out in California and having that kind of data for
17 the rest of the country, of course, would be a giant step
18 forward.

19 **SPEAKER:** It's interesting, it's been
20 mined and mined and mined, but that's how many
21 episodes out of how many episodes in the SCAQS data
22 base?

23 **MR. CASS:** Well, the problem has
24 been that there have not been the resources needed to
25 go any deeper into the data base and that's clearly the
26 case here, too, that the amount of money that's going to
27 get spent on data analysis has got to be commensurate

1 with the amount of data being taken or this is all a
2 waste.

3 **SPEAKER:** Well, just to be
4 obnoxious about it, the recommendation could be that
5 we should take the amount of money and use it to look
6 at the remaining episodes in the SCAQS data base.

7 **SPEAKER:** Not for those of us who
8 live in the northeast.

9 **MR. CASS:** In terms of balancing
10 the equities, we've got a much greater knowledge of
11 what's happening in California than we know about the
12 parts of the country where two-thirds of the country's
13 population live. It's just a giant black hole on detailed
14 aerosol data in the northeastern United States.

15 **SPEAKER:** One quick, just a
16 perspective. I was down in the San Diego basin, went
17 down there for a few minutes and they're proposing
18 many more measurements than you are.

19 **SPEAKER:** They're not as tired as I
20 already am. They're trying to analyze even a small
21 subset of data.

22 **SPEAKER:** This is just the first two
23 trailers.

24 **MR. CASS:** Okay, any more comment
25 from anybody that we should take back to the whole
26 group? If not, thank you for being here today, and
27 Pradeep and I will try to write up this whole document.

1 (WHEREUPON, the Breakout Group Session was
2 concluded at 5:20 p.m.)
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21 **C A P T I O N**

22 The Breakout Group Session in the matter, on
23 the date, and at the time and place set out on the title
24 page hereof.

25 It was requested that the Breakout be taken by
26 the reporter and that same be reduced to typewritten
27 form.

EPA/NARSTO PM MEASUREMENT RESEARCH

WORKSHOP

"Breakout Group: Source/Receptor Relationships"

July 23, 1998

MR. CASS: Okay, let's get started.

The general consensus was that we wanted a series of coordinated experiments rather than supersites that were simply being operated to gather environmental data at seven or eight sites independent of each other with no coordination, in other words, that we wanted to try to see if we could gather data that would be used across sites rather than just at one location at a time.

We wanted to err in favor of having more sites rather than fewer sites. Again, budgetary restrictions will probably determine the number of sites that can actually be implemented.

There was a sense that we should be looking not just at particles but at the gases, particularly photochemical oxidants and their precursors and take the opportunity to undertake experiments that could be used to interpret regional haze phenomena and atmospheric radiation phenomena. That would be essentially a study of the earth's albedo, in other words, reflection of the light back into outer space.

We have questions about the availability of manpower needed to operate that many sophisticated air monitoring stations. I think manpower is going to be

1 a key limitation. If the equipment is not operated well,
2 simply having the equipment is not going to be useful.

3 During the intensive experiments that we had
4 discussed, it would be valuable to have aircraft data as
5 a means of acquiring information about third-dimension
6 variables of pollutant and particle levels as well as a
7 long-term sample.

8 There were some reservations expressed by a
9 number of people about whether or not the aircraft data,
10 if taken, whether it would be used, because it has been
11 the experience of many previous experiments that the
12 aircraft data have not been delved into very deeply.

13 As a person who has had to make a choice
14 about whether or not to use a lot of aircraft data in the
15 past and who generally has not used too much of it, I
16 think I can tell you from my own experience that the
17 reason for not having used it is because it has been
18 very difficult to figure out where the airplane was at
19 any given point in time. Maybe the new GIS systems
20 can make that a lot easier for us.

21 Now, we are going to ask whether or not there
22 are organizations such as NASA or NOAA that might be
23 able to provide that aircraft data, as we have a feeling
24 it is pretty expensive information to gather.

25 There was a strong recommendation to
26 allocate adequate resources to data collection as well
27 as data analysis and modeling up front, all three

1 activities being necessary to gather any value from the
2 air quality modeling application and its data, and my
3 estimate would be that the analysis and modeling will
4 probably take about as much money as the raw data
5 collection itself. The analysis and modeling of a data
6 set this elaborate is going to take about a decade,
7 whereas the collection effort might be a year or two or
8 three, on that order.

9 Obviously, the collection of the data from, I
10 assume, permanent sites like the supersites could well
11 continue for a decade, and if it does, it is necessary to
12 make certain that that continued data collection does
13 not drain all the money for data analysis and modeling
14 which it has in many previous studies.

15 There was a sense that a three-year time
16 period was the minimum desirable for the data
17 collection activity, and there were a couple of reasons
18 for that. One was that we have an annual PM_{10} standard
19 that is defined over a three-year time period due to the
20 aggregate considerations, the frequency of violation
21 considerations, and, as a result, it is necessary to have
22 a three-year period to know how you stand with respect
23 to the standard.

24 But also from the point of view of people who
25 are interested in modeling typical conditions, our
26 experience has been that you can easily get wiped out
27 by one year of anomalous meteorology and wind up with

1 a data set that is not useful for regulatory purposes
2 because it was simply collected under conditions that
3 are not suitable to represent the rest of the years on
4 the future agenda.

5 Now, in terms of...well, let me...those two
6 points both represent three-year issues.

7 Now, of the general points that are on the
8 present slide, are there any of these that need to be
9 modified or that don't represent the general consensus
10 that we reached yesterday? Yeah, Bill?

11 **SPEAKER:** We were talking about
12 coordinating this with the satellite sites and things like
13 that. Is that coming?

14 **MR. CASS:** Yes, that is coming. I
15 just wanted to get this slide approved by people. Yes?

16 **SPEAKER:** Yeah, I would say with
17 regard to the aircraft data, if you coordinate the
18 aircraft activity properly, those data can be used, and
19 as a consequence, I think that that needs to be folded
20 into the use of aircraft data so that a plan is made that
21 the aircraft data, once taken, will really compliment
22 what is being done at the surface. It is a matter of
23 coordination, not that the data is just kind of sitting
24 there and intimately disconnected from what is being
25 done on the ground. It is a matter of coordination and
26 planning.

27 **MR. CASS:** Yeah. Well, as a

1 practical matter, I can think of two ways to raise the
2 probability that the aircraft data would be used, and
3 one is to charge the people who are making the aircraft
4 measurements with a very extensive analysis of their
5 own data and pay for it up front so they know what is
6 going to happen. That way, you would have an
7 interested party who is really going to go to work with
8 the data.

9 The other way to increase the probability it
10 will be used is to make the location of the airplane just
11 so painfully obvious that it is easy to coordinate it with
12 the ground-based measurements such that the people
13 who are analyzing the ground-based data are more
14 likely to want to incorporate it into their values as well.

15 Pradeep, maybe you can add a little to that
16 line to reflect not so much the question, but an
17 assertion that we need to build an approach that will
18 accomplish that.

19 **SPEAKER:** I consider the point that
20 we talked about yesterday about emissions data and
21 source profiles to be of a general type comment.

22 **MR. CASS:** Yes, we have another
23 page here, and let's add that to the discussion right
24 here.

25 **SPEAKER:** Oh.

26 **MR. CASS:** Okay, now, in terms of
27 the matter of the satellite sites, I think that we had a

1 lot of uses for the satellite sites, and we say here that
2 satellite sites can serve more than one airshed.
3 Obviously, they will have to, because we can't afford
4 more than maybe 40 or so, at the very most, satellite
5 sites.

6 They can serve more than one purpose as
7 well. The satellite sites can be used to fill in between
8 the major supersites. They can be used to look at a
9 rural versus urban contrast. They can be used to
10 represent boundary values. There are all sorts of
11 different things that you might consider a satellite site
12 to do.

13 Then, we get into a couple of observations
14 about emissions. I think it was Bill Vaughn that was
15 pointing out to us that we should be anticipating
16 increased emissions from prescribed burning, to try to
17 think about how to select a supersite and/or satellite
18 sites and measurement methods at those sites that
19 might distinguish between prescribed burning emissions
20 and the other emissions we have at present. That might
21 argue in favor of the selection of a site in the
22 Northwest.

23 We have the need, as you mentioned, for
24 acquisition of information on emissions. I think maybe
25 we should put a couple of dots below that that indicate
26 that we have reflection of the measurement of source
27 profiles.

1 **SPEAKER:** I have that in the next
2 slide.

3 **MR. CASS:** Right. The need
4 emissions information is not at the same level as need
5 models and modelers. Without emissions data, we don't
6 have an air quality modeling study, at least of the
7 transport reaction type.

8 **SPEAKER:** I wondered when you
9 were going to say that.

10 **SPEAKER:** Wait until you see what
11 shows up on the one at the meeting. This is like
12 Eisenhower's acceptance speech when he says and if
13 elected, I will go to Korea?

14 **SPEAKER:** Glen, in terms of
15 emission information, what is exactly the notion there?
16 Is that just simply an emission inventory or really
17 detailed count and condition or function and size of the
18 primary aerosol or...

19 **MR. CASS:** This is, I think, a
20 corollary to my, you know, statement that some people,
21 you know, sort of were a little shocked at that it was
22 going to cost as much for data analysis and modeling as
23 it would to collect the ambient air quality data. One of
24 the big costs within that big data analysis and modeling
25 cost estimate is the cost of acquiring high quality
26 emissions data for use for the models, and even if you
27 were not to undertake a program of new source profile

1 measurements, the cost of properly organizing the
2 emissions data in order to represent what we already
3 know about particle emissions from sources accurately
4 over the eastern half of the United States is a very
5 expensive undertaking.

6 **SPEAKER:** It seems to me that you
7 are information limited, because you have all these
8 inputs to your model, meteorology and sources, and you
9 are trying to make a prediction back, and if any one of
10 the data sets is weak or incomplete or doesn't have the
11 same degree of detail you are demanding in the
12 atmospheric data, then I think the whole experiment is
13 flawed in what you are attempting to do.

14 **MR. CASS:** Absolutely, and, you
15 know, we are talking...I think the numbers that have
16 been floating around for the cost of the field experiment
17 that has been discussed here are very large. If I were
18 to scale off of the SCAQS experiments, the SCAQS
19 experiments were, what, a \$7 to \$10 million...

20 **SPEAKER:** \$10 to \$12.

21 **MR. CASS:** \$10 to \$12 million
22 expenditure and represent approximately 1/7th or 1/8th
23 of the cost of this experiment, and that was in dollars of
24 a decade ago. So, this is at least a \$100 million field
25 experiment. In fact, it is probably three times that if
26 you were to put it out to private enterprise to do the
27 work. It might be \$100 million experiment if a

1 university would do it.

2 **SPEAKER:** I think another point, I
3 don't think the expertise or methodology even exists yet
4 to get high quality primary source data. In other words,
5 you'd want to get different composition...

6 **MR. CASS:** Well, about all I can say
7 is that we are getting some reasonable results in the
8 Los Angeles area based on having conducted two
9 rounds of source testing with the kinds of
10 instrumentation that are being talked about at these
11 supersites connected with the source sampling systems,
12 so that we do have in L.A. the highly sized result,
13 chemical result, and the emissions data...

14 **SPEAKER:** As well as dilutions
15 tunnels?

16 **MR. CASS:** Taken with dilution
17 tunnels applied to the stationary sources as well as the
18 mobile sources. And with that kind of emissions data
19 taken by methods comparable to the atmospheric
20 measurements and put into the models, it works pretty
21 well, and many of those sources are generic. They are
22 automobiles, they are diesel trucks, you know, things of
23 this sort, you know, hamburger joints, you know,
24 fireplaces, things of this sort.

25 But there are going to be other sources, the
26 whole fire power class, as well as various types of
27 industry that are important in other parts of the country

1 that aren't present in L.A. and haven't tracked.

2 So, I think that, you know, when we are talking
3 about money for data analysis and modeling that is
4 comparable to the cost of a field experiment, we are
5 talking about \$100 or more million for emission
6 inventory work to support...not emission inventory work,
7 but analysis and modeling and so forth to support that
8 data analysis effort.

9 With that kind of money, you could make some
10 real progress. At the same time, I think we should
11 express some skepticism about whether or not the
12 country is going to be willing to pay for that, and I
13 agree if they are not willing to pay for that, then this is
14 perhaps not worth doing, because it won't get done
15 well.

16 Yeah?

17 **SPEAKER:** Do I understand you to
18 say we have two sub-bullets under that? One was the
19 emissions input to the models which we were just
20 talking about, and the other is source apportionment
21 considerations, source profiles?

22 **MR. CASS:** Well, when you do
23 emissions inventory, there are two phases of that
24 activity. One is you need to make primary
25 measurements of what is coming out of really important
26 sources. Those are what I meant by gathering source
27 profiles.

1 What they mean is applying instrumentation to
2 the sources that looks like the instrumentation that we
3 are going to have at the ambient monitoring sites so
4 that if you were...if you have a model that is trying to
5 predict size-resolved chemical composition of the
6 particles and you are making the measurements of the
7 monitoring sites that tell you about the size-resolved
8 composition of the particles, you need to know the same
9 kind of information at the stack when the primary
10 particles from the sources were put in the air in the
11 first place.

12 If you don't, you can't shape the size
13 distribution of the secondary reaction products,
14 because they condense onto the surface of the size
15 distribution and composition of the primary particles.
16 So, you have to have comparable information at the
17 sources, or the models are not going to work.

18 Now, we have some information of that type,
19 and in the one place where we have that information,
20 you put it into these models, and we also have SCAQS-
21 like ambient data. The two data sets compare
22 reasonably well to each other. It is just that it is not
23 cheap to get that information.

24 It is also not any more expensive than running
25 the ambient experiment. They are sort of comparable.

26 **SPEAKER:** Some of the profiles are
27 generic in that, as you have pointed out.

1 **MR. CASS:** Yeah.

2 **SPEAKER:** I think that we need
3 some maybe advice as to what additional profiles might
4 be necessary for other locations in the rest of the
5 country.

6 **MR. CASS:** It is going to take a
7 special study, I think, for someone to sit down and say
8 what would it take to design an additional protocol to
9 do this. For example, the ammonia emission of the total
10 release for the U.S. needs to be upgraded considerably.
11 These models only work for high grade emissions, and
12 even if we don't have a lot of nitrate released at
13 present, we could have quite a bit of it released in the
14 future if animal husbandry operations continue to grow
15 up and if the sulfate aerosols were reduced so much
16 that they quit soaking up all the ammonia as well.

17 **SPEAKER:** And this needs to be
18 expanded, because the ozone people have focused on
19 other things.

20 **MR. CASS:** All right, now, in terms
21 of the intensive experiments, we were talking about the
22 need to try to represent a year through the use of
23 selected episodes that can be modeled with episodic
24 models with the episodes selected on the basis of their
25 ability to represent different meteorological classes
26 that occur throughout the year so that they can be
27 weighted appropriately. The estimate was that we

1 needed somewhere between...it would be around ten
2 episodes of 5 to 10 days' duration each.

3 The mention was made that some of the
4 difference between the 5 day and the 10 day estimate
5 has to do with how you treat, the way you split up the
6 models over a period of time before you can get to
7 actually compare them, that is, how you wash the
8 boundary conditions and the atmospheric conditions out
9 of the models.

10 We want to be able to acquire data for days
11 with clear and cool conditions as well as conditions that
12 are especially polluted. That, again, goes with trying
13 to represent an annual average in modeling as well as
14 just the episodic conditions.

15 That means that we are going to have to look
16 at episodes during the summer or during the transition
17 months. The selection of those episodes will have to
18 be done on the basis of...or the method to select those
19 episodes will have to be done on the basis of a special
20 study that will have to be conducted before the
21 experiments were run. So, we have a strategy, we're
22 thinking the intensive episodes rather than just the
23 parameter.

24 Any comments on these points?

25 **SPEAKER:** Well, I think a point
26 should be made...exactly what you said here...about the
27 fact that we are going to need data of the same quality

1 in terms of source integers as you need generally,
2 because I think a lot of people don't understand that
3 concept of really pulling the whole source attribution
4 and modeling program together. I think that is a very
5 important point.

6 **MR. CASS:** Do we need to put that
7 right up front, then?

8 **SPEAKER:** That would be my
9 suggestion.

10 **SPEAKER:** I think you should, too,
11 because it drives...

12 **MR. CASS:** We will make an
13 addition to the report at that previous slide. Thank
14 you.

15 **SPEAKER:** What was his comment
16 again?

17 **MR. CASS:** Well, his comment was
18 that we should make a really big point about the fact
19 that this statement on the issues is the...is not just a
20 comment. It is something that is a third the size of the
21 entire combined study or half as big...you know, that it
22 is of the same general magnitude as the problem of
23 getting the atmospheric data in the first place, and
24 without it, you don't have a monitoring program, at least
25 not a transport-reactor type program. But if you
26 filtered those out, of data...the rest of the modeling
27 networks would be on hold for quite a long time.

1 **SPEAKER:** But I think the point,
2 too, it is not a simple method required in cash and
3 impactors, that there is methodology that you all
4 developed in regional haze that seems to work very
5 well.

6 **MR. CASS:** Okay, now, these
7 represent additions to the base program that is
8 described in the document. To the list of equipment, we
9 would add ground-based LIDERS in order to determine
10 the depth of the particle layer.

11 We would be wanting to make measurements of
12 PM₁₀ concentration and composition, and I am not sure
13 whether we discussed how many locations, but I am
14 assuming that each of the supersites would probably
15 have to be instrumented for PM₁₀ at about the same
16 level as the filter based collections of PM_{2.5} so that if
17 the nation's standard, for example, were to revert to a
18 PM₁₀ standard, you know, we would have those data. I
19 think there is a serious chance that it might. So, we
20 better cover that base.

21 **SPEAKER:** The next to last one, is
22 that right? Measure dry deposition with aircraft?

23 **MR. CASS:** You are able to read
24 faster than I am. We are working real time here.
25 Pradeep is still making slides as we are reading the
26 slides.

27 Okay. So, I think we need to generalize at

1 least one location. Measure free radicals at ground
2 level as well as the aircraft. Measure organic
3 peroxides. Measure UV and total solar flux at the
4 surface. Report the spatial distribution of clouds and
5 fogs from satellite data.

6 Measure dry deposition with aircraft. Now,
7 that was the point you wanted to discuss?

8 **SPEAKER:** I think to measure dry
9 deposition came up, but I didn't know it was in
10 connection with aircraft.

11 **MR. CASS:** It was a measurement of
12 dry deposition at the surface in the original program
13 plan, and these are additions to that, and Christian was
14 mentioning that there were techniques for measuring
15 dry deposition which were used effectively in the San
16 Joaquin Valley that involved obtaining data on two
17 different gradients which is an important method for
18 getting the fluxes from aircraft measurements.

19 **SPEAKER:** And with that you should
20 get a different type of...

21 **SPEAKER:** I guess the feeling I
22 have here is we're already so far over budget that it is,
23 I guess, raises the question whether, perhaps I could
24 make a suggestion...

25 **SPEAKER:** Well, this is the aircraft
26 information for emission of dry deposition. Right?

27 **SPEAKER:** Yeah.

1 **SPEAKER:** Those emissions will be
2 measured in kind.

3 **SPEAKER:** I think we can put it in
4 the list now, then when somebody does the budgeting,
5 they...

6 **MR. CASS:** Or I could put the word
7 could in front of this to make it a physical possibility
8 and leave it open for...

9 **SPEAKER:** Yeah, I like that better,
10 too. I am all for an aircraft, but I don't think we can
11 afford to have it.

12 **MR. CASS:** All right. And then, the
13 suggestion was made rather strongly that we should
14 measure light extinction in addition to the light
15 scattering and absorption in order to close the radiation
16 project and make sure that the instrument
17 measurements are regionally consistent with each
18 other, and that is probably good advice as well.

19 Further additions, Warren made a strong
20 recommendation that we measure particle number
21 counts, light scattering, and light absorption at
22 satellite sites for the purpose of getting effective
23 information at relatively modest cost on total numbers
24 of particles that might aid in understanding what were
25 fine particle issues related both to health and to trying
26 to see if we could get information effectively on fine
27 particle concentrations from the light scattering and

1 absorption information and also assist the use of these
2 data on a broader scale modeling in understanding
3 regional haze problems.

4 The thought was that, in the overall scheme of
5 things, that would not be terribly expensive compared
6 to some of the other stuff that is happening here.

7 There was some discussion or admonition to
8 be careful about characterizing the environment in
9 which the methylometers are going to be operated.
10 Methylometers need to be thought of as either a heated
11 instrument or an ambient instrument and either a
12 humidity controlled instrument or ambient instrument,
13 and those decisions would have to be made before the
14 experiment would be programmed.

15 Then, there was discussion...it wasn't really a
16 recommendation. It was a clarification, because
17 Pradeep and I always had in the program plan an
18 attempt to meet some of the requirements for
19 continuous monitoring of particles using real-time
20 instruments like an aerosol time and flight master
21 thermometer. I don't know the politics yet, but NOAA is
22 working on it.

23 So, I don't think that is so much an addition as
24 it is a matter of clarification.

25 As for the question of how often and where
26 you can do that, that really is limited by the availability
27 of instrumentation and trained personnel. That's a

1 very serious implication in terms of could you...you
2 probably couldn't put one at every site at this point.

3 Then, we have the emissions characterization
4 experimental discussion. Again, we need to make sure
5 that we get our source profiles straightened out as a
6 part of the base program. You are not going to be able
7 to just sort of add that in ten years later.

8 I think there was general consensus that it
9 was advantageous to put the supersites in populated
10 areas, and the reasons for this were that if you put the
11 supersites in the populated areas, you can
12 simultaneously observe what were the regional
13 component of the particles as well as the urban
14 component that comes from primary sources.

15 Further, if you put the supersites in the urban
16 areas or populated areas, it is more likely they will be
17 compatible with...you could have a lot of people under
18 study from the point of view of health effects research
19 at the same time.

20 The satellite sites were going to be used, as
21 we said earlier, to determine boundary values, to look
22 at a trend to include gradients between the rural areas
23 and urban areas.

24 Now, there were questions raised about trans-
25 boundary transport, can we put sites across the border
26 in Canada and Mexico, and I think the answer was, of
27 course, we could and that it would be advantageous to

1 do that.

2 At the same time, we have not a lot of
3 supersites to go around, and I think the general feeling
4 was that we could probably provide enough assistance
5 to the folks in Canada to encourage their government to
6 maintain and/or work the Toronto activities into a
7 Toronto supersite. Are we being realistic about that?
8 Is that a viable approach?

9 **SPEAKER:** Yeah, something like
10 that. You are just indicating that it is a
11 recommendation and something important.

12 **MR. CASS:** Yeah. Do you think that
13 the coordination needed to match the protocols would
14 be available and so forth?

15 **SPEAKER:** Yes.

16 **MR. CASS:** I am assuming it is
17 largely a financial issue, because the only reason why
18 we wouldn't want to pay for the site in Canada is that
19 we are short of money. Right? I am assuming that is
20 the only reason. So, maybe something can be done to
21 boost the probability of getting national...

22 **SPEAKER:** And comparing both in
23 the sort of framework of things is also this variability in
24 broad-scale measures for this kind of thing over time,
25 so...

26 **MR. CASS:** Yeah. I talked with
27 some people last night about the situation in Mexico,

1 and it sounded as if it was pretty unlikely that the
2 Mexican government would be interested in chipping in
3 on this. So, that means we may have to site some
4 satellite sites to look at the trans-boundary problem on
5 our side of the border rather than in Mexico.

6 Okay. There was a very strong sense of a
7 number of people present that one of the supersites
8 should be in the Seattle area, and that may become
9 more probable in light of some of Ted Russell's
10 comments that the activities we are already planning on
11 building in Atlanta might currently meet most of the
12 needs within our supersite, and it may be possible to
13 move the little dot on our map that we had in Atlanta up
14 to Seattle, for example, without sacrificing the data that
15 we have been collecting in Atlanta. So, we can work on
16 approaching it that way.

17 The question of whether or not the midwestern
18 U.S., not midwest but the western U.S. site that was in
19 the middle should be...whether that should be in Denver
20 or the Utah Valley was left open, and I think that the
21 discussion should continue once we have the inputs
22 from the health people.

23 There was a further discussion that the
24 Chicago site might better be placed in St. Louis, and,
25 again, I think further thought should go into that
26 situation.

27 There may be other cities that should

1 have...be considered for reasons that we do not yet
2 know. It might be that, for some reason, the Cincinnati
3 site should be covered by the DOE efforts in Pittsburgh.
4 That site would be somewhere else for reasons that
5 have to do with the health effects work going on
6 downstairs.

7 The ratio of supersites to satellite sites could
8 range from about 6:1 routine. The observation was
9 made that the ordinary operation of a speciation
10 monitoring network would provide us with information
11 valuable to the modeling community, even if it wasn't a
12 high time resolution, it would be a high chemical
13 resolution.

14 Yeah?

15 **SPEAKER:** I have got a real problem
16 with that, recommending anything above something like
17 6 because of the cost factor. We are so far over our
18 costs already.

19 **MR. CASS:** I am sorry, something
20 like 6?

21 **SPEAKER:** As far as ratio of
22 satellites to supersites. I'm really concerned about
23 recommending anything above approximately 6, because
24 of the cost considerations.

25 **MR. CASS:** I am, too. I think that it
26 is unlikely that we are going to get the money to even
27 run a base experiment with a time ratio of 7 supersites

1 and 6 satellite sites per supersite, but there were
2 people in the room who wanted more. There always are,
3 and the question is how does this group want to deal
4 with more is better, because more always is better, and
5 we probably are not going to get it all the time.

6 **SPEAKER:** I think it's important for
7 us to say where we are willing to cut and at what level
8 we're willing to cut.

9 **MR. CASS:** My personal preference
10 would be to have fewer satellite sites and better quality
11 data and more emissions measurements and all of the
12 better analysis program than to try to fill in all of the
13 geographic areas that we might wish to have.

14 I think the general notion was something like a
15 large-scale modeling program which means is that you
16 are going to have to validate the data against
17 measurements made at a large number of sites but that
18 you will not have a measurement point at every city
19 where you would like to have a measurement point, and
20 you are going to have to trust that if the model is
21 performing well, that those places where you have
22 checked it through a priori decisions about siting that,
23 in fact, the model is probably performing fairly well in
24 those places that are not monitored. That is the
25 assumption that is going to have to be made.

26 Yeah?

27 **SPEAKER:** What is the tradeoff

1 between the supersite and the number of satellite
2 sites? I mean, if you take one supersite out, how much
3 is your ratio going to increase?

4 **MR. CASS:** Okay, that is a good
5 question. I don't think this has been costed out yet.
6 My estimate just off the top of my head...well, first, it is
7 going to depend on how the satellite sites are set up.
8 If the satellite sites are staffed with personnel
9 borrowed from the air pollution control industries
10 during intensives, and those people can return to their
11 previous jobs at the end of the ten days experiment or
12 something of that sort, then the costs are going to be
13 fairly modest. I mean, most of the costs are chemical
14 analysis of the samples.

15 On the other hand, if people have to be hired
16 and let go as operators repeatedly, it is going to get a
17 little expensive. So, it depends a lot on getting smart.

18 If you assume that the satellite sites are
19 really ordinary speciation monitoring sites that are
20 being kicked into high gear only for a particular
21 episode, that their routine operators become their
22 intense operators, then the cost would be pretty
23 modest.

24 The cost of chemical analysis of one set of
25 PM_{2.5} filter samples is about \$120 for a three-filter set,
26 something like that. So, if you are taking six of those a
27 day, let's say you have got \$1000 a day in chemical

1 analysis for that site.

2 If you throw in PM_{10} , it makes it \$2000 for
3 chemical analysis and data recording. If you decide to
4 do that on 100 days a year, you know, or 100 days over
5 a three-year period which is the upper limit for doing an
6 intensive, now you are up to \$200,000 for the chemical
7 analysis per satellite site, and that, you know, at the
8 ratio of 6:1, that is about...let's see, 40 times \$200,000
9 you're up to close a million dollars per satellite site,
10 and then you have got the extra bucks for
11 meteorological support, et cetera.

12 You don't have to pay for the equipment,
13 because the speciation monitors are already there. The
14 CFCs and methylometers and stuff, you have probably
15 got another, let's say, at most, \$100,000 worth of
16 equipment invested in fine particles. Now, you are
17 looking at about \$1.1 million, and then there is going to
18 be a lot of cost for management, costs for management
19 personnel.

20 Let's say that a satellite site might run you \$2
21 million. Something like that.

22 **SPEAKER:** Over a three-year
23 period.

24 **MR. CASS:** Yeah, for a three-year
25 period. Something like that.

26 **SPEAKER:** That concept doesn't
27 come across real clearly unless you're taking one of

1 those satellite sites where your concept is into high
2 gear and you're exploring the possibility of doing less
3 than four hour, and the other model is year long 24-
4 hour which is also higher gear....

5 **SPEAKER:** That is a good point,
6 because earlier on the table, the discussion on the
7 speciation committee was going towards daily
8 measurements, assuming that there would be daily
9 measurements.

10 **MR. CASS:** That is right. Yeah, it
11 probably would add another...you know, you might
12 double the cost if you had to pay for the cost of the
13 everyday sampling. Anyway, you are talking about
14 several million dollars per satellite site for a three-year
15 period.

16 **SPEAKER:** Times about 40 of them.

17 **MR. CASS:** Times about 40 of them,
18 yeah.

19 **SPEAKER:** On top of the supersite
20 costs.

21 **MR. CASS:** Yeah, that is right. So,
22 I think that there is no question but that there is not
23 going to be enough money to go around for an
24 excessive number of satellite sites.

25 **SPEAKER:** Are we ignoring the sites
26 that might already be funded and operated under other
27 programs and that could be used to get the same data

1 as the satellite sites or possibly with a little bit of
2 modification?

3 **MR. CASS:** How many of those are
4 there?

5 **SPEAKER:** I don't know that. I do
6 know in the size sample we are going to have several.

7 My other comment would be that, you know,
8 the difference between 6 and 15, what scientific
9 questions we will be able to answer with 15 satellite
10 sites versus 6.

11 **MR. CASS:** My personal preference
12 would not be to go to 15. Were people in the room
13 when they were saying well, look at all the holes that
14 are going to be left in the map if you don't have more
15 satellite sites, and the answer is I don't think the
16 money is realistically available.

17 **SPEAKER:** And I think, therefore,
18 what scientific questions can we answer at these levels,
19 and then the answer becomes fairly clear.

20 **MR. CASS:** Yeah.

21 **SPEAKER:** It is real hard to
22 calculate on the spot individual costs for these sites. I
23 would like to see a recommendation that is more global
24 in the sense that what do we feel the total costs
25 should...the ratio of the total costs to operate all the
26 satellite sites to the ratio of operating the supersites.
27 So, one number compared with another, all the costs for

1 operating the supersites, all the costs for operating the
2 satellite sites without figuring out what those numbers
3 are in each case, but what should that ratio be? What
4 should the range of that ratio be?

5 **SPEAKER:** I would like to hear
6 people's comments on that. Should it be 100 to 1?
7 Should it be 10 to 1? 3 to 1? 1 to 1?

8 **SPEAKER:** Doesn't that fall out of
9 the design of the experiment?

10 **SPEAKER:** Well, I think that
11 would...I would like...it seems to me that would be an
12 easier number to guess at at this point without getting
13 into individual costs, detailed costs of what you are
14 going to do at every site.

15 **SPEAKER:** Bill is not here. He
16 should be coming, and I think...I think what he would be
17 suggesting is not necessarily taking the number of
18 supersites as a given and then deciding what to
19 multiply it by, but I would assume that Bill would be
20 interested in maybe trading off between supersites and,
21 you know, slightly fewer supersites and many more
22 satellite sites.

23 **MR. CASS:** The way I would view it
24 is I would say to myself I wouldn't want to drop below
25 about 6 satellite sites per supersite, because the
26 satellite sites alone give me a lot of the information
27 that I would need to modify and study them all by

1 themselves, and, obviously, they are going to be a lot
2 less expensive than the supersites. My sense is that
3 about half of the experimental money would go into the
4 supersites and about half would go into the operation of
5 the satellite sites.

6 **SPEAKER:** At a level of about 6 to
7 1 or so.

8 **SPEAKER:** On a regional scale, if
9 you had one of these here, go back to...if you have one
10 of these, you need to six to go around just to get that
11 picture that sort of small regional airbase...

12 **MR. CASS:** No, no, no, I am talking
13 about you are basically trying to use the satellite sites
14 to fill in...they would serve a number of purposes.
15 First, you are going to have to assign about one or so
16 of each of the groups of satellite sites to measure
17 ambient values, and you'll have to put out satellite
18 sites to gather inputs that are reflected in the
19 modeling. That is going to take up a couple along the
20 Gulf Coast, pick up a couple along that line that
21 stretches from the middle of Texas to address trans-
22 boundary questions.

23 So, you are going to set up several satellite
24 sites around the perimeter, and then you are going to
25 want to look at the health community boundary situation
26 with respect to the supersites. Then you are going to,
27 say, oh, well, here is the supersite in Atlanta, and the

1 next one is up in Chicago. I better put a satellite site
2 halfway in between Atlanta, let's say, in order to try to
3 get a sense of what the satellite is gathering.

4 **SPEAKER:** Well, I just think about
5 it, I guess, somewhat like that. If you take eastern
6 region, though, and how many satellite sites, I mean,
7 can you characterize that like that in addition to the,
8 we call it five supersites that might be in there? How
9 many satellite sites do you need when you are doing the
10 model evaluation in that region? You know, not
11 thinking of it in terms of ratio, but just thinking,
12 characterize that. Because I think you need some more
13 pristine satellite sites as well. We have got these
14 supersites just in urban areas, and I don't know...

15 **MR. CASS:** Well, the boundary sites
16 were intended to capture hemisphere in the area.

17 **SPEAKER:** But I think you need also
18 air in the, you know, helpful sites in the north to
19 northeast was, in the southern New York area, southern
20 New York State away from urban influence somewhat so
21 maybe if you get transport from the Midwest, you can
22 characterize that.

23 **MR. CASS:** Yeah. I think you'd be
24 talking about spreading a number of these guys out in
25 the middle of the areas...

26 **SPEAKER:** I don't think we have the
27 time to really give the details. Our main purpose is to

1 have less of those sites.

2 **SPEAKER:** Glen, one thing I might
3 say, though, maybe it could be an explicit
4 recommendation of the general discussion groups for
5 experimental design, and that is to exploit, whenever
6 possible, the existing state of existing programs. In
7 other words, if we sort of talk about...you have
8 mentioned several times we could do this, but perhaps
9 we should make that a recommendation to do.

10 **SPEAKER:** That is covered next.

11 **MR. CASS:** Yeah, let's put up the
12 next slide. The next item down below that is that if
13 resources are limited, which I can guarantee you they
14 will be, that we may have to drop some sites.

15 **SPEAKER:** The question is, is
16 climatology and meteorology, should they be a
17 consideration in siting possibly?

18 **MR. CASS:** Sure. I think that there
19 is going to have to be a special study conducted to site
20 these.

21 **SPEAKER:** Could we say that?

22 **SPEAKER:** There are quite a few of
23 the improved sites which is basically in these certain
24 area.

25 **MR. CASS:** That is right, yeah.

26 **SPEAKER:** The problem is that most
27 of the sites don't have paid meteorologists. So, if we

1 can just spare somebody to put in there, we could use
2 those sites.

3 **MR. CASS:** That is a good point.

4 **SPEAKER:** That applies to satellite
5 sites as well as to what you said, the speciation sites,
6 improved sites, they all could serve potentially as
7 satellite sites.

8 **SPEAKER:** Jeff Cook of the
9 California ARB a couple weeks ago was putting together
10 a national list of sites that had instrumentation. They
11 are probably already obsolete, but at least he has got
12 that list.

13 **SPEAKER:** I am wondering if I hear
14 us defining...this question of what is sort of the proper
15 balance between supersite and satellite sites and what
16 is the right number and so on, I hear us kind of defining
17 what is becoming sort of a supersite clustering, sort of
18 a central site and at least six satellite sites. Is...

19 **MR. CASS:** Yeah, I wouldn't view it,
20 though, at least in the case of the eastern U.S.
21 assemblage, as being a cluster. I think that what you
22 are talking about is the economic reality that satellite
23 sites are less expensive than supersites, so you can
24 have more of them, and you need more locations.

25 At the same time, they give you less
26 information. So, you don't want to put all of your eggs
27 in that basket, and where do you draw the...what is a

1 reasonable compromise between the value of a
2 supersite and the value of a satellite site.

3 And at least from our experience in SCAQS, a
4 ratio of about, you know, 6 to 1 or so seems to be a
5 comfortable number in terms of expanding the number of
6 locations you are looking at while not throwing your
7 budget all in one direction or the other.

8 **SPEAKER:** Let me turn it around.
9 For instance, would it be better for us to have a
10 supersite operating by itself without any satellite sites
11 or given the desirability of having satellite sites around
12 supersites, should we perhaps, if it came to that,
13 sacrifice some supersite locations to be able to provide
14 the necessary satellites around supersites in principal
15 locations?

16 **MR. CASS:** Okay, the only...the
17 thing I am trying to change about the statement you just
18 made is I wouldn't view the satellite sites as orbiting an
19 individual supersite in the eastern U.S. If we have five
20 supersites inside the modeling domain, you have 30
21 satellite sites that are free to be located anywhere
22 within that grid in order to make...to serve a specific
23 purpose.

24 **SPEAKER:** I see.

25 **MR. CASS:** So, you would say where
26 do I have to put sites in order to define the boundaries
27 and what is going across the boundaries of this region,

1 where do I have to put some sites in order to get clean
2 air internal to the region, where...you know, let me in a
3 couple of places look at upwind/downwind ratios across
4 a supersite, and let me also decide that I have got to
5 fill in between the supersites even if they are not
6 upwind/downwind areas. I have to put something
7 between Atlanta and Chicago to fill in the gap.

8 **SPEAKER:** Maybe they should be
9 called something different than satellite sites.

10 **MR. CASS:** Yeah, okay. Come up
11 with another name.

12 Okay, we have the comment that we should be
13 trying to take advantage of other experiments that are
14 already planned and underway like the ones in Atlanta
15 that would provide supersite-like data that is already
16 programmed. We have identified Atlanta and Pittsburgh
17 as two locations, for example, where prototypical
18 supersites are going to exist in any case, and, for
19 budgetary reasons, we should take into consideration
20 the opportunity to upgrade those sites and/or discuss
21 with them their experimental plans and so forth to see if
22 it is possible to lay off as many as two supersites that
23 might otherwise be needed, thereby bringing the cost
24 down.

25 Yeah?

26 **SPEAKER:** Couldn't you make that
27 same point very strongly here about those satellite

1 sites, that it would be very useful to look carefully at
2 leveraging the satellite sites against already existing
3 networks or sites similar to the satellite sites that may
4 already be in existence like the improved sites?

5 **MR. CASS:** Yeah, we need to make
6 the same point about satellite...

7 **SPEAKER:** That is the important
8 thing.

9 **MR. CASS:** Yeah, we need to make
10 the same point about the fact that we can...the whole
11 concept of the satellite sites was to leverage the
12 speciation network that was going to be put in place for
13 other reasons, and we should make the point that there
14 may be other networks like the improved network where
15 that leveraging can exist as well.

16 **SPEAKER:** Is it possible in that first
17 bullet there to consider recommending that if we have
18 this supersite in Canada but it is lacking whatever, one
19 small portion, we don't have it, can we move materials
20 up there in the supersite program so that it can be a
21 full supersite?

22 **MR. CASS:** Sure, we can make that
23 recommendation. I think that if you asked how much of
24 this capability exists with in EPA at present, the answer
25 is not a whole lot either, but all of this is going to have
26 to be contracted for, and bought, and put together,
27 because the expertise needed to build a supersite does

1 not exist in any one location at present. It has to be an
2 assemblage.

3 So, the...if we start incorporating supersites
4 and satellite sites with other ongoing activities, then
5 there needs to be some thought put into how to assure
6 compatibility between measurements that we make
7 across those various programs.

8 **SPEAKER:** That is it. Great.

9 **MR. CASS:** Now, are there major
10 points that have been overlooked in this discussion? Is
11 there anything that we should be adding beyond the
12 things that we just discussed? Yeah, Bill?

13 **SPEAKER:** Just a comment. Based
14 on the general discussion that went on yesterday, what
15 if the health guys say...what if it turns out that
16 pesticides or fines or ultrafines are important or
17 something of that sort. Is that something that we
18 should be addressing here in the sense that if that is
19 the case, then the source/receptor relationships as it
20 relates to these other goals...

21 **MR. CASS:** Well, for example,
22 thanks to Loren's recommendations on the satellite
23 sites, if they come in and say we need to know about
24 ultrafines everywhere in the United States, we have the
25 information to do it, because we have not only the small
26 end of the particle size distribution being characterized
27 at the supersites, but we have CFC counts at all of them

1 which is basically the ultrafine particle number counts
2 concentrations at all of the satellite sites as well, and
3 if you wanted to build a model for that, I think you could
4 probably attempt to do it.

5 Yeah?

6 **SPEAKER:** The concept of archiving
7 samples, filter samples or...for the very same reason
8 that if somebody later says it is compound X that is
9 important, how do we systematically store those
10 samples and are there mistakes that can be avoided in
11 terms of storage.

12 **MR. CASS:** Yeah, I have been
13 making use of archived filters out of my own freezers
14 for years, and my laboratory is now running out of
15 space to put more freezers, because I have got, at this
16 point, about ten freezers in the lab, and...

17 **SPEAKER:** It might be useful to
18 have some sort of a facility like that.

19 **MR. CASS:** DRI has a huge walk-in
20 freezer, and the samples in there are stored quite
21 nicely, but at the same time, other contract laboratories
22 put used filters in the closet, and within a matter of
23 weeks, they are not good for anything anymore. So,
24 definitely, I think we need to archive not just data but
25 the physical samples.

26 Yeah?

27 **SPEAKER:** Another aspect of being

1 responsive to the health community is in the emissions.
2 Presumably, the emissions and measurements are going
3 to be carried out at the same time as the ambient
4 measurements, but it is going to be harder to go back
5 and characterize...of the health people come in with a
6 certain class of sources or certain aspects of their
7 emissions, it is going to be harder to get those after the
8 fact.

9 **MR. CASS:** Yeah. Well, I don't
10 know. About all I can say is we need a comprehensive
11 emissions inventory to drive the models. The chances
12 that we will characterize the magic source are pretty
13 good.

14 **SPEAKER:** But it is quite possible
15 that we won't characterize the...I mean, there is no
16 chance of getting a comprehensive emissions inventory
17 of all the possible aspects of emissions.

18 **MR. CASS:** Right, yeah. I don't
19 know how...I mean, the kinds of source tests that we
20 can run for purposes of driving our models are taking
21 measurements from the particle sources that look very
22 much like the atmospheric measurements, they're
23 putting differential mobility analyzers and condensation
24 nucleus counters and moving impactors and filter based
25 samplers onto the source tests and getting size
26 distributions and chemical composition by size and
27 neutron activation analysis and base metals model size,

1 and I don't know what more you've got...we haven't
2 measured particle acidity at the source, or something
3 like that. That would be an example of a hole in the
4 source testing program that you would never recover
5 anything.

6 **SPEAKER:** How many return visits
7 do you make to a source? I mean, is it emitting the
8 same in June that it emitted in last October?

9 **MR. CASS:** Generally, generally
10 what you have to do is to make as many measurements
11 of the same type of source but not the same source as
12 you can. If you run a test of a fleet of motor vehicles
13 where you want to test, you know, carbos that burn in
14 many different ways, so you usually have to go back
15 and test the same source six months later. So, what
16 you do is you take data on the activity of the source,
17 and when you are at the source, you characterize its
18 emissions when it comes to activity level, and you
19 estimate at the other times, you know, what their
20 activity level records will infer about what they were
21 emitting.

22 You know, it would be nice to have, you know,
23 these kinds of measurements made with continuous
24 stack monitors, but I don't think you are going to get
25 high resolution size data, high resolution chemical
26 composition data off a stack monitor. I don't know what
27 to do about it.

1 We are going to not have as much emission
2 data as we would like to have. But usually my opinion
3 is as a person who does modeling work that I have less
4 emissions data than I have atmospheric data almost
5 always. The programs tend to do a much better job in
6 delivering enough atmospheric measurements than
7 emissions measurements, and that will probably be the
8 case here no matter how many times we put in the
9 report that we want it.

10 Further comments?

11 **SPEAKER:** What time do we meet
12 downstairs?

13 **MR. CASS:** 10:30. Okay, let's take
14 a 10-minute break.

15 (**WHEREUPON**, the Breakout Group Session was
16 concluded at 9:24 a.m.)

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C A P T I O N

The Breakout Group Session in the matter, on the date, and at the time and place set out on the title page hereof.

It was requested that the Breakout be taken by the reporter and that same be reduced to typewritten form.